SCIENTIFIC AMERICAN

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THE RETURN OF THE PEARY EXPEDITION.

The latest Arctic adventure of Lieut. R. E. Peary, C.E., U.S.N., while devoid of sensational adventures and discoveries, was crowned with entire success from a scientific point of view, and this success will materially strengthen the interest with which his future work will be regarded. He has shown conclusively that his ideas and methods of Arctic exploration are eminently sane and practical and entirely free from the theatrical. The great meteorite and the collections he gathered are worth all the expense and labor of the voyage, and the scientific world is in his debt for the pains he took in securing them.

In his last expedition no attempt was made to reach a very high latitude. The idea of the expedition being to establish a principal base of supplies from which the explorers could start next season.

The Hope came into Sydney, C. B., on September 20, burning her

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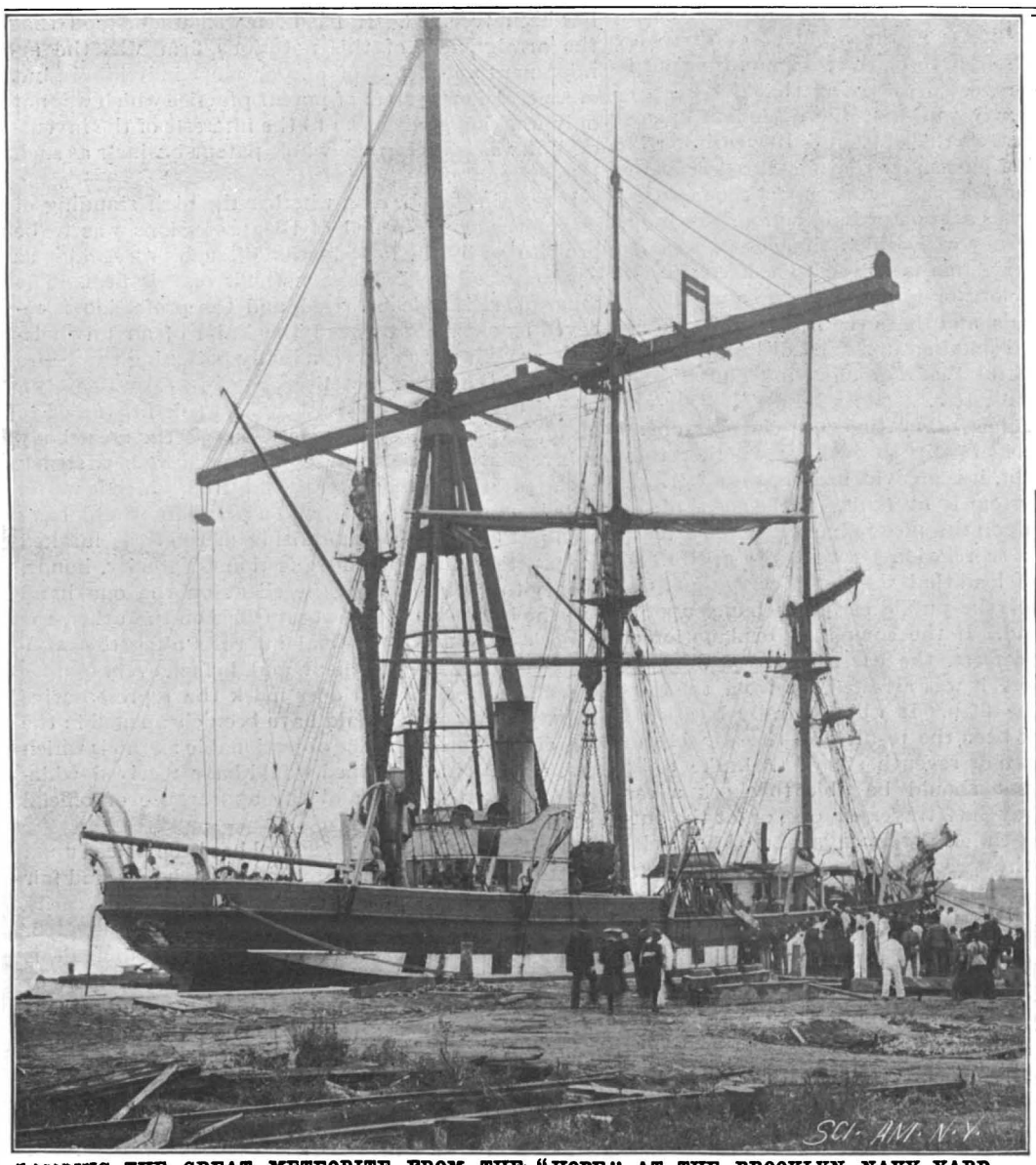

LANDING THE GREAT METEORITE FROM THE "HOPE" AT THE BROOKLYN NAVY YARD.

ESQUIMAU DOGS.

ESQUIMAU MAN AND BOY.

RAISING THE GREAT METEORITE FROM THE HOLD OF THE "HOPE."

THE RETURN OF THE PEARY EXPEDITION.

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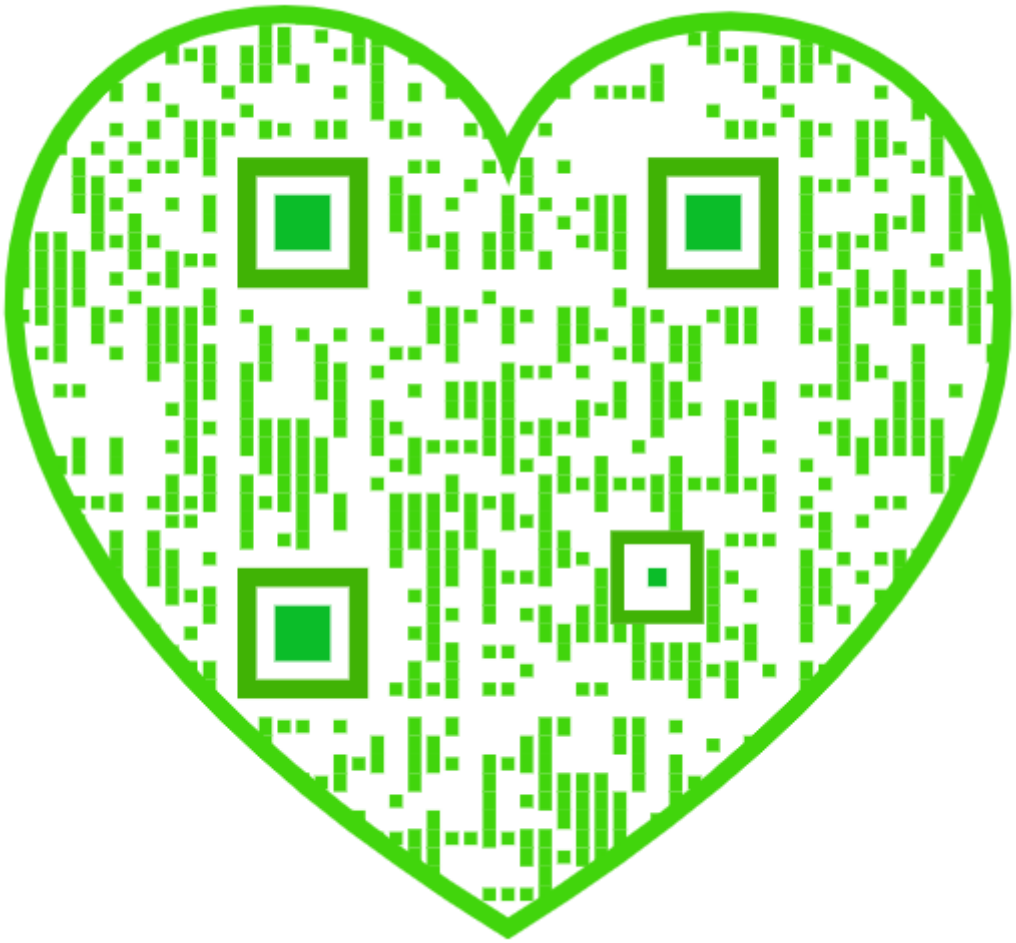

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NEW YORK, SATURDAY, OCTOBER 16, 1897.

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ANOTHER RUNAWAY ELEVATOR.

Another fast running hydraulic elevator in one of the tall New York office buildings recently dropped beyond the working speed, and was brought up by the safety clutches with a jerk that severely shook up the car load of passengers, and in the case of one man caused a dislocation of the knee. Coming so quickly after the accidents of the past few months at the American Tract Society building, this mishap is distinctly unfortunate for the reputation of the hydraulic system of elevators as such—for the elevators at the Bowling Green building, where this accident took place, are of the same type that earned an unenviable notoriety a few months ago, when one of the cars ran away, with results similar to those in the accident of Thursday week. The representative of the company that put in the elevators is reported as saying that the cause of the car running away was that the attendant opened the valve that controls the descent of the car too wide for the full load of passengers that filled the car at the time, and he felicitates the public upon the fact that the safety clutch was so prompt in its action. To judge from the complacency with which the makers seem to regard the accident, one is driven to the conclusion that this type of elevator is liable to run away at not infrequent intervals, and that even if the victim suffers from an occasional shaking up, or a dislocated joint, he must be thankful that a quick-acting clutch saves him from a worse disaster.

As a matter of fact, every time the clutches on an elevator are automatically thrown in, whether they stop the car or not, it is an evidence that the working of the elevator system is at fault. If the speed of the car is to depend upon the nice judgment of the attendant as to the proper relation between the opening of the valve and the load that the car is carrying at the time, the safety of the public certainly hangs upon a very slender thread. If the company's explanation of the accident is correct, the car must have dropped eight stories before it was arrested, or from the thirteenth story to the fifth. It will naturally be asked: What would have been the result had the car begun to drop at the sixth or seventh story? A brake to be thoroughly efficient should be able to check a car before the runaway has traversed one, or, at the outside, two stories. Unless the makers of hydraulic elevators can place the speed of the car under better control than the recent mishaps would indicate, they must be prepared to see this type driven out of the field by the positive control which marks the worm and pinion gear of the electric elevator.

RAPID TRANSIT SCHEME APPROVED BY THE PARK BOARD.

The Park Board of the City of New York has withdrawn its inopportune obstruction to the scheme for providing rapid transit, and this great work is to go forward, as far as the board is concerned, even if its prosecution should involve the destruction of two or three trees at the Battery. The members of the board who have now voted to approve the plans of the tunnel are to be congratulated on the prompt action which they have taken. The motives which led the Board originally to oppose the plans were commendable, for the Battery Park has already been abominably disfigured by the erection of the elevated road, and it should be the first duty of the guardians of this historic ground to see that no further outrage of the kind is permitted. In the present case the removal of the trees would take place in the interests, not of a private corporation, but of the people themselves. It was a case of sacrificing a minor public interest to one of vast proportions, and the Park Board, in retiring from its former position, has evidently taken this view of the case.

Meanwhile the hearing before the Appellate Justices drags wearily along. The engineer for the rapid transit commission has long ago given his testimony and explained in full detail the amended plans and estimates by which he has been able to cut down the cost of the work to less than $30,000,000, and it must be admitted that the estimate has every indication of being careful, detailed, and conservative. It is based upon the accumulated experience which the large engineering operations of the kind in the past twenty-five years have provided, more particularly in the very city in which the new work is to be done. The plans were amended to meet the objections of cost which the opponents of rapid transit raised against the Broadway scheme, and the route is now laid out beneath the adjoining thoroughfare—Elm Street—recommended by the experts who testified against the first plans. Yet for the past few weeks the hearing has been taken up with a mere reiteration by the engineers of the enemies of rapid transit of the same objections that were urged against the first scheme. Civil engineers whose reputation for professional sincerity is surely worth something to them do not hesitate to make the obviously preposterous assertion that Mr. Parsons' $30,000,000 tunnel is liable to cost from $50,000,000 to $60,000,000. Civil engineering is as exact a profession as any other; and estimates on a tunnel whose floor is but 15 feet below street level can be made with at least as much certainty as for deep and difficult river foundations. It does not take an engineer to perceive that in the appalling list of contingencies which the expert testimony against the tunnel scheme is detailing with weary iteration, the "wish is father to the thought."

THE SUPPRESSION OF A FRAUDULENT SYSTEM OF PATENT PRACTICE.

Everyone who appreciates the deep interest which is taken by inventors in all that concerns the Patent Office and the general patent business of the country will understand the feeling of relief with which the news of the disbarment of Wedderburn & Company has been received. It has been well understood that the arraignment of this notorious firm was the arraignment not merely of one or more individuals, but of a pernicious system of patent practice which was not only working great harm to the interests of the inventor, but was bringing the whole patent business as such into disrepute.

It remained to be seen whether the high standing of one of the most learned of the professions was to be prostituted by the introduction of such proceedings as characterized the business methods of this firm. The atmosphere is at last cleared, and the profession is relieved by one skillful cut of the knife of an unwholesome growth which was gradually poisoning the entire system of the patent practice.

Had the charges preferred against this firm failed to stand, it would have been disastrous for the great body of inventors at large, for a blow would have been struck at the prestige of the Patent Office from which it would have been slow to recover, and a premium would have been put upon such demoralizing methods as marked the practice of the firm in question. Veracity, honor, fidelity to the interests of the client on the one hand and the interests of the Patent Office on the other, the disposition to make personal interests altogether subservient to those of the client, and, in fact, every quality which should mark and does mark the representative patent practitioner, would have been cheapened in the eyes of the world, and the objectionable methods which have now been condemned would have received widespread advertisement and the appearance of official sanction.

As it is, an additional safeguard has been placed upon the interests of the inventor, and the honor and fair name of one of the most difficult, responsible and easily misunderstood professions has been signally vindicated. That the profession of patent attorney is difficult, is shown by the fact that its duties necessitate a more or less intimate acquaintance with the history and present status of the various arts and sciences the world over; that it is responsible is seen from the fact that the brightest hopes, and what are considered to be the most valuable secrets of the inventor, are intrusted to its keeping and largely depend for their fulfillment upon the fidelity with which the trust is preserved and prosecuted; and that it is misunderstood, is shown by the fact that its recognition is not in any degree commensurate with the knowledge, skill and fidelity which are necessary for the effective discharge of its duties.

The public, however, have not been the only victims, for at least two United States Senators have no doubt innocently been persuaded to aid the scheme by allowing their names to appear as members of the Wedderburn board of award.

The interests of the patent practitioner are insignificant in comparison with the widespread mischief which was being done to the public in the lowering of the whole tone and spirit of the patent business. The methods of the now disbarred firm appealed to the most sordid instincts of the people, and sought to invest the patent system, which is intended for the encouragement of useful inventions, with the features which characterize a reckless game of chance. The public was encouraged to invent, not with the object of improving existing arts, but for the purpose of obtaining monetary rewards and empty and meaningless badges of distinction. The luckless inventor was urged on to enter fields which had already been thoroughly covered, and he was encouraged to apply for patents on devices which were as old as the hills. This trading upon the credulity of the public was worked to such advantage that it grew exceedingly lucrative—a fact which was duly noted by a few other equally unscrupulous but less daring firms who followed with more wary steps along the lines which the pioneers in these extraordinary practices had laid down.

With regard to these smaller firms, whose offense has been only a little less glaring than that of the one in question, it can only be hoped that the strong hand with which Commissioner Butterworth has crushed the chief offender will now be laid upon every firm whose methods are in the least degree questionable. While it may be a difficult matter to prescribe an exact code of ethics for the guidance of those who represent the inventor before the Patent Office, the recent inquiry has shown that there is, at least, a speedy and drastic remedy for such grossly irregular practices as have lately been flaunted before the office.

The field for genuine invention is vast and ever increasing. With every new discovery new avenues are

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opened to new lines of invention, but whatever work there may be, must be done along legitimate ways and to fill legitimate wants.

In the decided course which he has taken the Commissioner has had the full sympathy of the public. He has done a great service to the patent interests of this country, a service whose effect will be widespread and permanent.

NEW EASTWARD RECORD FOR THE LINER KAISER WILHELM.

In our last issue we recorded the fact that the westward ocean record from Southampton to New York had been reduced to 5 days 22 hours and 35 minutes, by the new North German Lloyd boat Kaiser Wilhelm der Grosse. In this number we are able to announce that this fine ship captured another record, that from New York to Southampton, on her return trip across the Atlantic. The run from Sandy Hook to the Eddystone lighthouse, fourteen miles south-southwest of Plymouth breakwater, was made in 5 days 15 hours and 10 minutes. If we allow 6 hours for the run from Plymouth to the Needles, it is fair to assume that, if the Kaiser Wilhelm had not called at Plymouth, she would have made the whole distance in about 5 days 21 hours, which is about 13 hours less than the record trip of the St. Louis.

An analysis of the run shows that it was in every way a splendid performance. On five consecutive days the ship covered over 500 knots per day, something that has never before been accomplished on the eastward passage, on which the nautical days are less than twenty-four hours long. The daily runs were as follows in knots: 367, 504, 500, 507, 510, 519, and 55 knots up to the hour, 2:25 P. M., at which she reached the Eddystone lighthouse. The run from the lighthouse to Plymouth consumed one hour, and by 10 o'clock on Wednesday night the mails which had left New York on the previous Thursday were landed in London. The average hourly speed for the whole trip was 21·91 knots, which, considering that stormy weather and head winds were encountered, was a better performance than the 22·01 average of the Lucania, made in fair weather.

In this connection it should be mentioned that the carriage of the mails from New York to London is made by the fastest boat and the fastest long distance train in the world. When it was decided to make Plymouth the first port of call for the North German Lloyd boats the Great Western Railway inaugurated a special tidal train to meet them. This train is made up as soon as the boat is signaled and runs without a stop from Plymouth to London—194 miles—at the rate of 53⅓ miles per hour. The train is not a mere racing outfit, such as used to be sent to Scotland on the northern lines during the famous competition a few years ago, but is a regularly scheduled train, weighing over 200 tons and carrying a full load of mail, baggage and passengers. The speed, comfort and safety of this combined rail and steamer journey is an eloquent tribute to the engineering genius of these latter years of the nineteenth century.

OPENING OF THE PNEUMATIC POSTAL TUBE SERVICE IN NEW YORK CITY.

Shortly after noon on the 7th instant the first section of the pneumatic postal tube service, which is now being installed in this city, was opened for regular service in the presence of the invited guests of the Tubular Dispatch Company, who are putting in the plant. The completed section runs from the General Post Office through Beekman, William and Stone Streets to the station at the Produce Exchange, a distance of 3,750 feet. There are two tubes, each 8⅛ inches in diameter, the bends being made of brass and the straight sections of cast iron. The interior surface is smoothly finished off to assist the passage of the carriers. At each station there is a transmitter and a receiver of an improved design, specially constructed for this plant. The air-compressing plant is located at the General Post Office, and a pressure of 6 pounds to the square inch is employed for the present, though the pressure, and consequently the speed, may be increased if desired. The carriers consist of sheet steel cylinders, 24 inches long and weighing about 12 pounds. Each of these can hold about 600 letters, and it is estimated that about 250,000 letters per hour can be carried in each direction when the operators are fully accustomed to the work. When a carrier has been loaded, it is placed in a charging tray and pushed into a section of tube, a little longer than itself, which is then swung over into the line of the main tubing. The air carries it to its destination, where it automatically operates a cushioning device, which reduces its speed just before it falls into the receiving tray.

The ceremony of inaugurating the service was performed by Dr. Chauncey M. Depew, who, acting under the direction of Mr. John E. Milholland, the president of the Tubular Dispatch Company, placed in the carrier a Bible wrapped in the stars and stripes, a copy of the President's inaugural address and other documents. The lever was pulled at 12:16:20 P. M., and at 12:17:50 P. M. it reached the Produce Exchange, 3,750 feet distant. Here it was opened and inclosures were made, the carrier finally arriving at the Post Office at 12:21 P. M., or 4 minutes and 40 seconds from the time it was sent away.

An experiment was recently made to determine the time taken to send a message over practically the same route as that covered by the postal tubes, by various systems of communication. The test showed that the round trip occupied thirty-three minutes by a messenger boy, thirty-three minutes by a wagon, fifty-six minutes by telegram, and three hours and ten minutes by mail one way.

Dr. Depew, in a characteristic speech, insisted upon the fact that every device that assisted in the development of speed was a direct contribution to the advancement and prosperity of the world. He stated that though the pneumatic delivery system had received its first application on a large scale in London and Paris, it would probably be the New World that would extend the system and show the wide range of its possibilities. He is satisfied that the installation of a complete network of tubes, answering in its scope to the telephone of to-day, would effect a revolution in the business methods of the retail tradesmen, placing them in hourly touch with the wholesale houses, in some cases practically increasing their capital 300 per cent. Second Assistant Postmaster-General Shallenberger designated the postal tube system as the most important commercial enterprise of the past twenty-five years. He stated that, when the system has been completely extended in the metropolis, it will be possible for the Post Office to deliver messages to the limits of Greater New York in less time than by telegram. Moreover, the system makes it possible to expedite the transmission of letters from the outskirts of New York to the outskirts of Chicago, St. Louis or other large cities by from twenty-four to twenty-six hours. The business men of New York and Philadelphia will be able to send a letter and receive an answer between these two cities within the limits of the business hours of one day.

We hope to give an illustrated description of the new plant in an early issue.

THE AMERICAN INSTITUTE FAIR, NEW YORK.

The American Institute, which is now holding its annual fair at the Madison Square Garden, is one of the historical institutions of New York City. For many years the record of its proceedings was largely a record of the progress of the country in the industrial arts, and the winning of its medals was one of the most coveted distinctions in the industrial world. The list of early prize winners contains such names as those of Samuel Colt, Richard M. Hoe, Samuel F. B. Morse, George Steers, and many others only less renowned in the world of art and science. The annual fairs attained a popularity which extended far beyond the limits of New York City, and they came to be looked upon as positive landmarks in the onward march of invention.

From various untoward causes the fortunes of the Institute, after many decades of unbroken success, began to decline, until, in 1892, the annual fair was discontinued. Last year, mainly through the efforts of Mr. Charles Chamberlain, Director of the Institute, the fair was revived again, and a fairly successful exhibition was held during the month of October in Madison Square Garden. This year, under the superintendence of Mr. Alfred Chasseaud, a successful effort has been made to extend the scope of the undertaking, and certain new features, notably a fine art exhibit and an exhibit of fruit and flowers, have been added. Altogether the display, as seen from the gallery of the building, is a marked advance upon that of last year, and gives reason to believe that this commendable institution is rapidly regaining its old time prestige and usefulness.

Near the Madison Avenue entrance to the hall is an exhibit of architectural ironwork by William R. Pitt, of New York, which deserves special mention, both for the durability, the fine finish and the artistic appearance of the material. Some of the designs in composite cast and wrought iron are extremely handsome, and the composite gates, guards and rail and stair work have the finish and beauty of hammered ironwork.

The A. A. Griffing Iron Company are again conspicuous exhibitors at the fair. They show one Bundy hot water heater and one steam heater of the same name, one steam and one hot water La Villa heater, the former with an automatic draught regulator in place. The regulation is effected by means of a diaphragm in a closed drum, upon which the steam acts if the pressure exceeds a certain point. The diaphragm acts by means of levers upon the damper, closing the draught. At the same time it blows a whistle to attract the notice of the attendant. The exhibit also includes a line of Bundy gravity pumps, feed water heaters, steam traps and steam and oil separators.

The grinding of spectacle lenses is illustrated at the stand of Mr. L. Alexander, of New York, who has a large model at work. On the lowest platform of the model are several blocks of crown glass from which the slabs are cut by means of a reciprocating band of steel, the operation being similar to that of sawing marble slabs. The small slabs are then roughly chipped into circular shape and placed upon the "moulds," which are rotating disks of bronze whose surface is curved to the desired shape of the lens. As the mould rotates, the lens is held stationary and ground with emery to the proper curvature. It is then polished. It takes five hours to grind a lens. The moulds wear rapidly and have to be periodically trued in a special lathe. The spherical lenses are ground from three inches to one hundred and forty-four inches, and the work is done on a variation of three millimeters. The surface of lenses which are used to correct long and short sight is spherical. Up to within the last dozen years this was the only correction that was extensively practiced; but of late years the optician has placed within reach of the general public glasses which correct "astigmatism," a defect due to an oval form of the cornea. This correction is made with a glass which is part of the shell of a cylinder. There is also a prismatic lens for the correction of the defect known as "cross eyed." In some cases the eyesight is affected with all three defects, and a complicated composite glass is used which includes the three forms of lens.

Dana, of New York, has a stand with a collection of the best work of his studio, and on the northern side of the hall is an exhibit of photographic work which is of special interest. We refer to the photographs in color by Edward Bierstadt, of Reade Street, New York. Many beautiful specimens are shown, and they include a variety of subjects. One is struck with the extreme brilliancy of the coloring in the landscapes. So bright are they, indeed, as to give an appearance of overdone artificial coloring. A most interesting case is that which shows the process in detail. The first picture is from a negative taken through a violet blue screen and printed in yellow. Then follows one from a negative made through a green screen and printed in red. No. 3 shows the result from a negative taken through a red screen and printed in blue, and No. 4 shows the effect of photographing through a yellow screen and printing in neutral tint. The combined result is a remarkably exact and clear reproduction of the original painting. It is in the reproduction of paintings, indeed, that the new process is most successful, the results being very fine. In this exhibit may be seen the first photographic portrait ever made. It is a portrait of Miss Draper, of New York, taken by her brother, Prof. Draper, of this city, in 1840.

The readiness with which electricity lends itself to automatic appliances has been noted by an ingenious inventor, who has used it to good effect in an electrical rat trap. The device exhibited at the Fair consists of a narrow passageway of wire netting, in the middle of which is a swinging door containing the bait. When the trap is set, this door is closed. As the rat approaches, it steps on a contact maker which swings the door out of the way, and, as the victim passes on, another contact mechanism causes the door to shut behind him.

The Micrometer Balance Scale Company has an exhibit of scales on which the weight may be determined quickly and with great exactness. The weight end of the scale is provided with a quick acting horizontal screw, upon which is a weighted cylinder. The weight (corresponding to the position of the cylinder) is read off on a horizontal scale in pounds and the ounces are read off on the periphery of the cylinder weight. The scales are shown in many varieties, from the ordinary counter scales of the grocer's store to the fine prescription balances of the druggist.

In these days, when special attention is directed to questions of hygiene, the very complete exhibit of Knight asbestos filters should command attention. The filters are shown in a variety of sizes, from the small concern, suitable to the cottage or small city flat, up to the largest sizes for hotel use. As the filter is a device which is intended to remove only those impurities which are in suspension in the water, it is evident that its efficiency will be directly proportional to the small size of the interstices—the fineness of the mesh, as it were—in the filtering medium. If an impurity is to be removed, the interstices must be smaller than the particles of which the impurity is made up. The Knight asbestos filter makes use of a strainer made of layers of asbestos, the fiber of which has been finely separated, giving it a soft, woolly texture. A pile of this material several feet in thickness is compressed to a thickness of half an inch, and it is then cut into the sizes and shapes required. The simplest form of filter consists of a metallic bucket-shaped vessel with a fine gauze bottom. The asbestos pad is laid upon the gauze and a second wire screen is placed upon the asbestos and pressed down upon it with a thumbscrew. The exhibitor made experiments in which the water put into the filter was dyed a deep color with washing blue, and after filtration came away colorless. Starch was also removed. An examination of Thames water by Professor Attfield, of London, showed that the microbes which it contained were entirely removed by the asbestos pads. We shall give a further notice of the fair in our next issue.

LONDON omnibuses carried 83,277,814 passengers during the first half of 1897 and traveled 12,743,242 miles.

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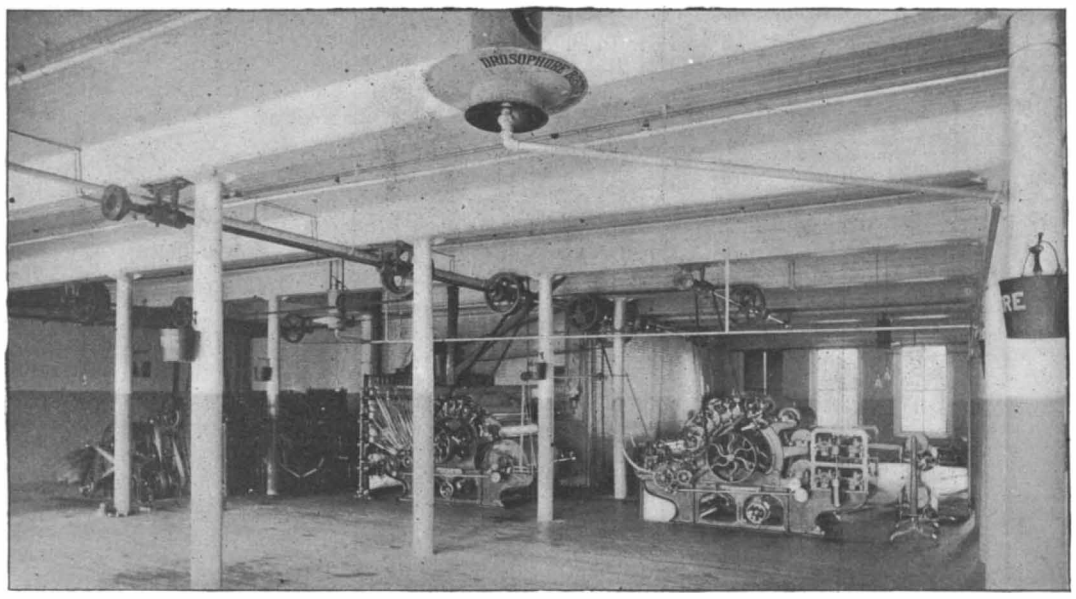
THE LOWELL TEXTILE SCHOOL.

We are apt to consider that the trade school is a product of the nineteenth century, but in truth it goes back to the middle ages. The apprentices really attended trade schools, and during the time when they were learning their trades they were under the direction of the guild. The admission of an apprentice was an act of special solemnity, and as it was the beginning of a kind of novitiate to citizenship, it generally took place in the town hall. At the expiration of his apprenticeship the lad was received into the guild with special forms and solemnity and became thereby a citizen of the town. This corresponds to examination and graduation in the modern trade schools. The apprenticeship system is, of course, largely in vogue at the present time, but in the trade school the information is imparted in a thorough and practical manner, and it is to the trade school that we must look in future for the educated and trained mechanics who are fitted to superintend the work of others.



WOOLEN SPINNING ROOM.

It is doubtful if any industry in the world requires more attention to detail, and a knowledge of the machinery and the principles which underlie their operations, than does the manufacture of textile fabrics.

At every large exposition the attention of visitors is always attracted by the textile exhibit. There is something particularly attractive in the series of processes involved in converting the raw fiber into yarn or in the swiftly running loom producing elaborate fabrics. The idea of a textile school is not a new one. One will in Germany in a couple of years celebrate its fiftieth anniversary. In America there are only two textile schools, but these are both important ones, and it has been the good fortune of the Lowell Textile School, which forms the subject of the present article, to be in a position to eclipse all other existing textile schools in the world in the completeness and variety of its equipment.

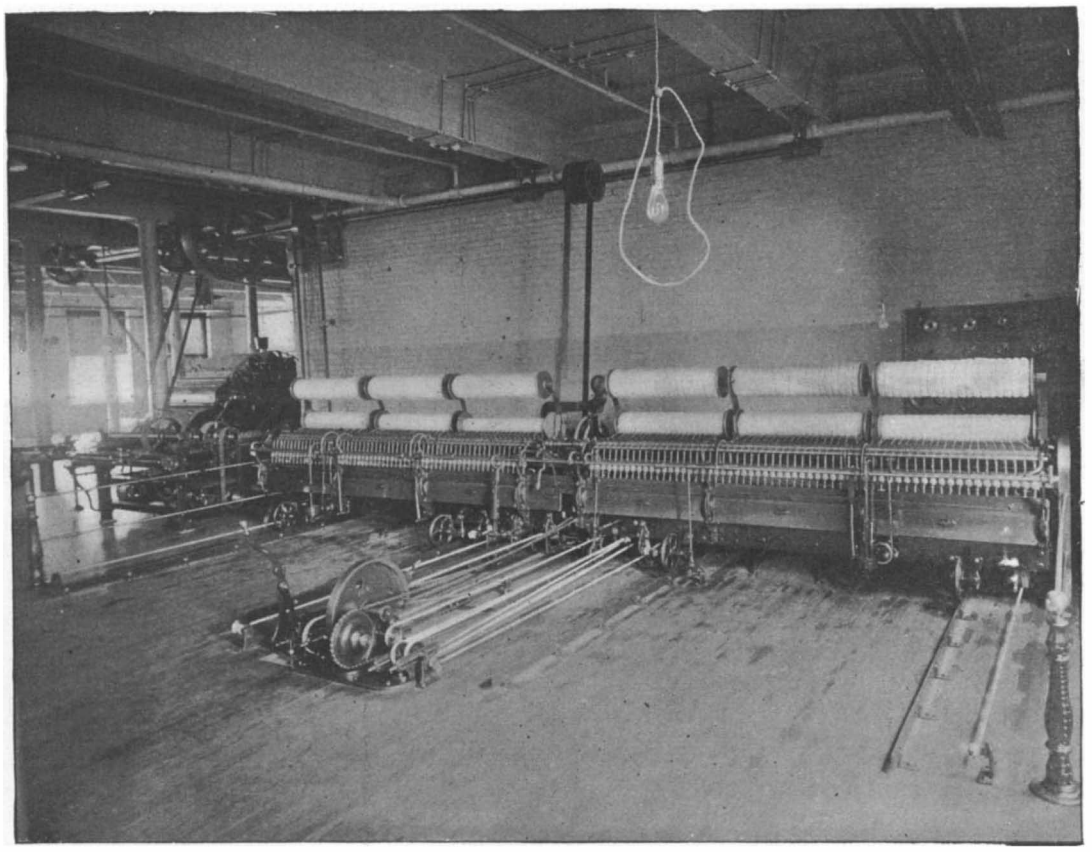
The school is admirably located at Lowell, Mass., and within the radius of a hundred miles are included many of the most important textile industries in the United States. The arrangement of the school is admirable in every respect. Its equipment includes passenger and freight elevators, electric lights and power, humidifiers and a complete system of fire protection, together with all of the most modern machinery which can be considered at all necessary for the equipment of a school or mill. The school is specially interesting from the fact that all of the machinery is operated by electric power, and in the near future it is likely that all progressive mills will be operated in the same manner.

The trustees include mill treasurers, agents and superintendents in various parts of the Merrimac Valley, under the presidency of Mr. A. G. Cumnock, of Lowell, and the capital invested in the mills they represent amounts to about $25,000,000. The advice and experience of these trustees is not only a benefit to the school and its equipment, but it is also advantageous for a young man to be educated under the supervision of men who have it in their power to practically recognize ability and progress in studies. The practical features of the school are carried throughout. Almost all of the members of the teaching staff have been practically engaged in the manufacture of textile fabrics. The director of the school is Mr. Christopher P. Brooks, who has for many years held the position of mill superintendent.

The instruction is divided into several sections; the principal departments are the day classes for regular students and the evening classes for the people employed in the mills. In the day classes, which are held both morning and afternoon, arrangements are made for the training of students in any one of four courses. First, the cotton manufacturing course; second, the woolen manufacturing; third, the designing; and, fourth, the dyeing. These courses overlap to a considerable extent, so that a student in any one branch attains sufficient knowledge of other branches so far as they appertain to his own section, but the work is specialized as far as possible, so that at the end of the three years' course in the school, the student will have the knowledge of a practical manufacturer.

In the evening school the work is much more specialized, as the evening students have less time to devote to the work than the day students. The evening students have all the advantages that the day students have in manipulating the machinery and taking the same subjects of study.

The application of art to fabrics is one of the most important subjects that is to be dealt with in a textile school, and in the Lowell school arrangements have been made for the art instruction to form part of the regular course, and ultimately every branch of applied art, which can in any degree be considered applicable to textiles, will be taught there, whether applied to the artistic adornment of the fabric or in any process, such as printing, etc.



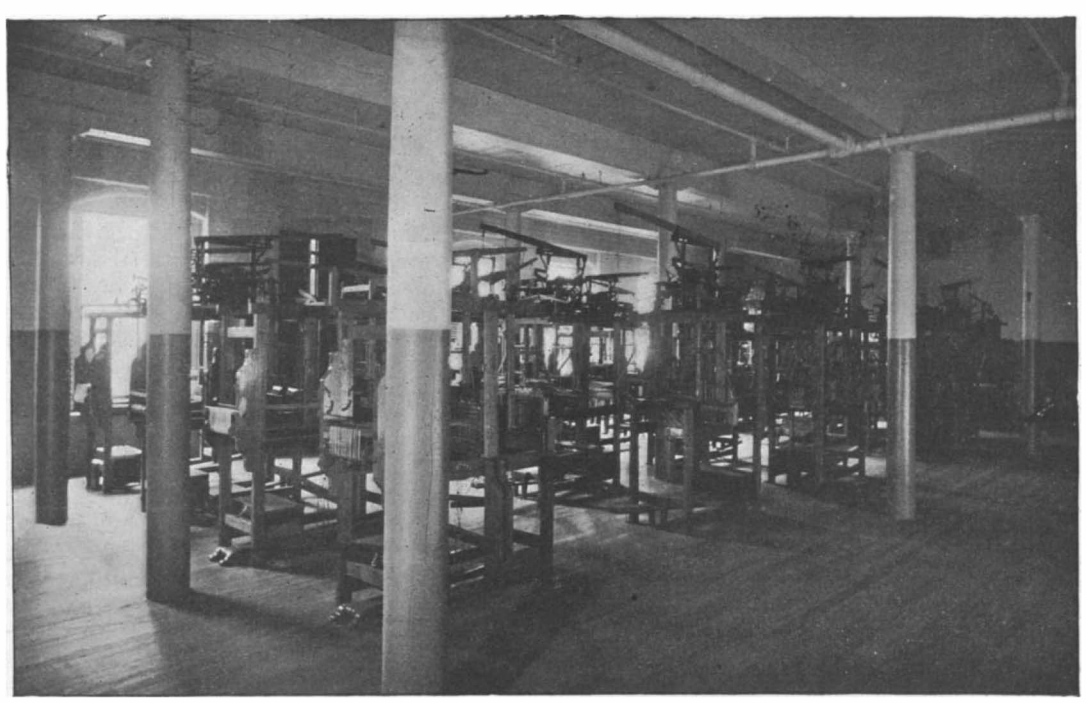
WOOLEN SPINNING.

The chemistry and dyeing section of the school is one of the most important. Several thousand dollars have been spent last summer in equipping the room with all the apparatus that experienced manufacturers and the board of trustees of the school could recommend or that experienced instructors from other institutions found advisable.

There is a bewildering variety of machinery in the school, and our three engravings give an idea of only a few of the rooms. The list of the various pieces of machinery which the school possesses occupies five pages of the excellent catalogue issued by the institution. They include the complete equipment of a cotton mill, a woolen mill, and a silk mill; all of the machinery being of the very latest type, and, as already stated, run by electric power.

The collection of power looms includes representative machines from almost all of the American loom makers, and looms capable of weaving all varieties of fabrics. Among others are noticed a group of jacquards from the Knowles Loom Works, Providence, R. I., and some handsome carpet looms from the shops of the Crompton-Knowles Loom Works, Worcester, Mass., with plain looms, dobby looms, leno looms, lappet looms and other masterpieces of weaving machine making. In the same room is a collection of machinery showing the various methods of preparing and dressing warps, both for cotton, woolen, worsted, and silk fabrics.

There is between the leading nations of the world a continuous industrial warfare existing. Tariffs and



HAND LOOM WEAVE ROOM.

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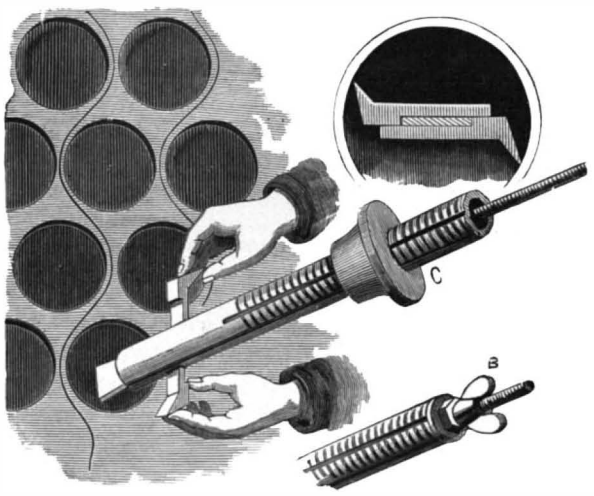
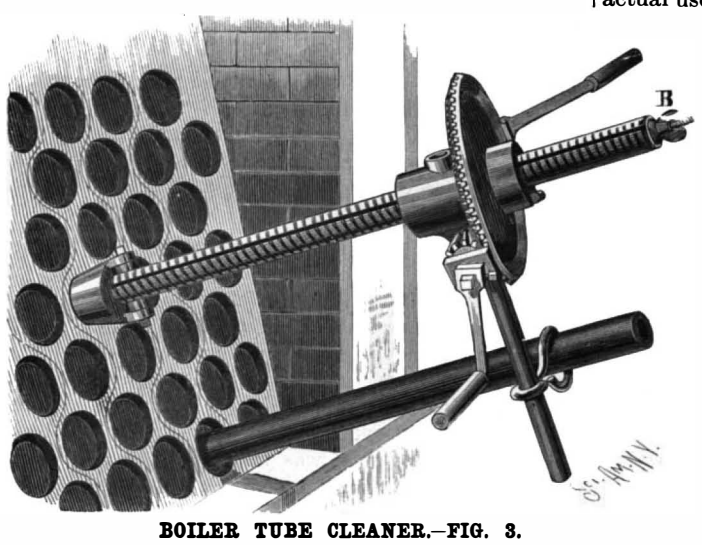
treaties are of great importance in modifying the conditions under which this war is conducted, but no tariff can keep out the highest productions of art or make up for the disadvantages that exist in the lack of a population of artisans thoroughly trained in eye and hand. There are over $100,000,000 worth of textiles imported into this country every year, all of which represent special advantages that are possessed by no other country, and principally the advantage of a highly trained industrial population. All the leading European nations are spending fabulous sums in the establishment of trade schools of all kinds, not necessarily all in textiles, but in every branch of industry they realize the great advantage that nations like Germany have received in the possession of specialized trade schools in their midst during the last twenty years.



BOILER TUBE CLEANER.—FIG. 2.

AN IMPROVED BOILER TUBE CLEANER.

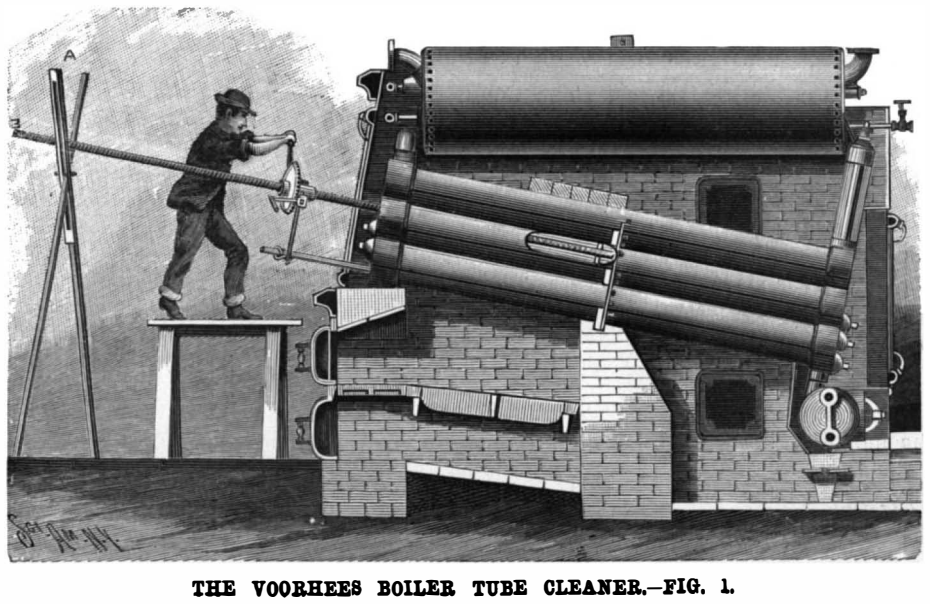
The illustrations represent a boiler tube cleaner so constructed that the tool may be readily loosened in the tube, and its cutting edges brought into greater or less contact with the inner surface of the tube, for removing scale or other matter, the cutting edges of the tool being adjustable from a point without the boiler. An adjustment may also be made to enable the tool to be fed lengthwise of the tubes as required, the tool having a similar cutting action to that of a like tool in a lathe, whereby the scale may be perfectly removed. This improved tube cleaner has been patented in the United States, and in Great Britain, France, Germany, Spain, Belgium and Canada, by John H. Voorhees, of the old established lumber firm of Hardy, Voorhees & Company, of Brooklyn, N. Y. Fig. 1 represents the manner of operating the cleaner, a portion of one of the boiler tubes being broken out; and Figs. 2 and 3 show enlarged details of special parts.



BOILER TUBE CLEANER.—FIG. 3.

The device which holds the cutters, and to which power is applied, is an exteriorly threaded heavy hydraulic pipe or casing tube, of 2½ inches outside diameter, the thread being 1½ inch pitch, and the pipe having a featherway on which the gear power attachment slides. Within this pipe is located an expanding rod, the inner end of the rod having a wedge form, and being adapted, as indicated in Fig. 2, to be passed between a pair of cutters, the drawing outward of this rod thus effecting the spreading of the cutters. The adjustment of the cutters for the proper cleaning contact with the interior of the tube is effected by means of a thumb nut on the outer end of the rod, the nut bearing on a cap which closes the outer end of the casing tube, as shown at B, in Figs. 2 and 3. The chisels or cutting tools are of steel, ⅝ of an inch thick by 1½ inches wide, and they are of such shape that they are designed to sharpen themselves in use, conforming to the interior of the tube until they are almost worn out. The casing tube is inserted through an interiorly threaded nut, meshing with the thread on its exterior, as shown at C, Fig. 2, this nut being placed in position at the outer end of the boiler tube after the cap of the latter has been removed. Power is applied through a gear attachment which has a feather by means of which the casing tube and its cutters are revolved. It may be slipped up and down the pipe and placed at any convenient point to operate, usually as close to the boiler as possible. The fulcrum for the power attachment consists of a 3 inch pipe placed in any of the adjoining tubes, and the gear is driven by two small pinions moved by cranks operated by two workmen.

This cleaner is furnished with its main pipe or casing tube all in one piece, where there is room enough in front of the boiler, or it is made to be joined in two sections to operate where space is limited. The gear attachment need not be removed from the tool at any time during the operation of cleaning, after it is once in position ready for work. The only parts of the cleaner that show any wear with long use are the chisels or cutting tools, and as they last well and are inexpensive, it is evident that the machine may be in actual use for years without practically any expense beyond its first cost. The inventor has found, as a practical result of his experience with this cleaner, that a boiler of 100 horse power may thus be cleaned in three days' time, or at the rate of about twenty tubes per day.



THE VOORHEES BOILER TUBE CLEANER.—FIG. 1.

Does Pure Water Pay?

Prof. William B. Mason, of the Troy Polytechnic Institute, has lately published a book on water supplies, and in plainly holding up to view the costliness of obtaining a new pure water supply, or of modifying and altering an old one, he demonstrates that no community can afford to rest with anything short of pure water, known of all men to be such. He cites the evils to be expected from any of the waterborne diseases, but especially writes of typhoid fever from the cool, calculating standpoint of commercial loss. He says:

"The economic value of an individual is what it has cost his family, the community or the State for his living, development and education; it is the loan which the individual has made from the social capital, in order to reach the age when he can restore it by his labor."

It is difficult to compute the value of a man in dollars and cents, and yet the attempt has been made. Chadwick rated an English laborer at about $980; Faer estimated him at $780, while a French soldier is reckoned at $1,200. Typhoid fever—nearly always a waterborne disease—chooses for its victims those in the prime of life, seldom attacking the very old or the very young, which has led able judges to give the valuation of $2,000 for a man in the prime of his vigor. Mr. Mason selects as illustrative a city of 100,000 people, such as Albany, N. Y., where the deaths from typhoid have averaged seventy-five for the last five years. Calling each man lost as worth $2,000, it means a direct loss pecuniarily of $150,000. Funerals range from $20 to $30, so taking a mean of $25, it adds to the amount of direct loss each year $1,875—making a total indirect loss of $151,875.

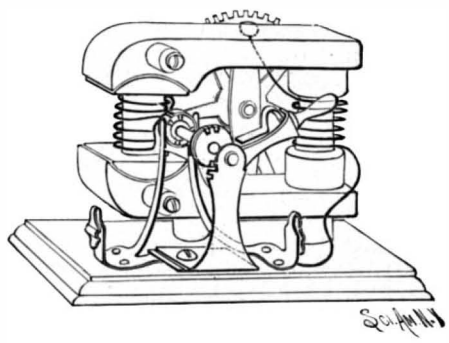
But this fever does not always kill. The mortality is reckoned at ten per cent of those attacked, and the average period of convalescence is reckoned at forty-three days. Assuming nine recoveries for one death, there are found 29,025 days lost by those who recover—over seventy-nine years; reckoning wages at $1 per day, there is a loss of $29,025. Nursing and doctors' bills are at least $25 per case, adding $16,875 to the gross sum. To sum up:

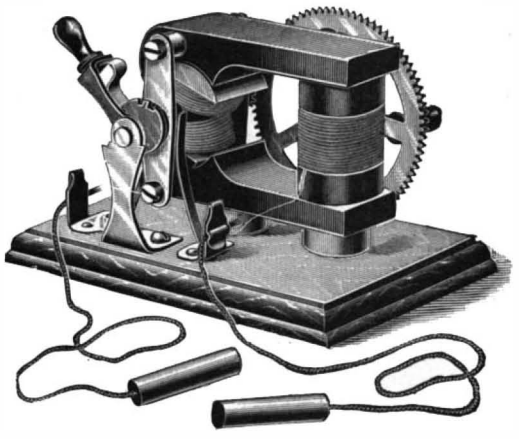
75 deaths at $2,000 each	$150,000
75 funerals at $25 each	1,875
Loss in wages of convalescents	29,025
Nursing and doctors' bills	16,875
Loss for one year by typhoid—total	$197,775

A heavy sum to be levied on one city by typhoid in one year; and the bare statement of the facts draws its own moral, and the sum would pay the interest on costly waterworks that could in no way be characterized as "death dealing."—The Independent.

A NEW HAND DYNAMO.

Our illustrations represent an interesting novelty in the way of small electrical machines, made to sell at a low cost, and that may be used in schools as well as families. The outline view shows the machine with one of the bearing plates removed to illustrate the armature connections with the commutator. The machine represents in a most simple manner how electricity is produced for practical purposes, whether by power applied or chemically, by means of a battery, the machine being also an efficient one for many useful purposes, as for electroplating and electric decomposition, and especially for its effects on the nervous system, in connection with many lines of medical treatment. It is being brought out by R. H. Ingersoll & Brother, of No. 65 Cortlandt Street, New York. It weighs less than a pound, and is a direct current dynamo, operated by a handle on a large gear wheel, the latter meshing with a small gear to rapidly rotate the armature shaft. The field is an electromagnet made to do the work of a permanent magnet, being given greater strength when in use by being centrally wound with a coil of insulated wire through which the current is passed. The magnet holds sufficient residual magnetism to start itself at all times. A simple form of commutator brushes, not liable to get out of order, is applied near one end of the armature shaft, and at one side of the shaft bearing, on one end, is a small pulley to which a belt may be applied when the device is to be used as a motor. Integral with and on the outer side of this pulley is a disk, having teeth on opposite edges, adapted to be engaged by a current interrupter, or circuit-breaking lever, which may be swung into or out of position to make and break the circuit and cause the machine to give shocks of greater or less strength as the armature shaft is rapidly revolved, one of the handles being then held in each hand. In the larger view the circuit breaker is shown in position to thus make and break the circuit, in giving shocks, but in using the machine for electroplating, electrolysis, etc., the current interrupter is swung back, as shown in the outline cut, and the two conductors are connected, positive and negative, respectively, with the anode and cathode in the plating solution. To run the dynamo as a motor, four or five cells of any kind of battery are connected with it to form the circuit, and thus operate the armature shaft instead of by turning the large gear wheel, a belt being then run from the pulley to any small machinery the battery is strong enough to work. The current afforded by this little machine can in no way be dangerous, but it is especially well adapted for therapeutic purposes, for the treatment of rheumatism, neuralgia, etc., as well as for quite a variety of experimental work, running small incandescent lamps, ringing magneto bells, etc.





INGERSOLL'S MAGNETO-ELECTRIC MACHINE.

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Nationality and Scenery.

In the introduction to an article in the Deutsche Rundschau, descriptive of the German landscape, Herr Friedrich Ratzel shows by a few well directed allusions how the intrinsic character of the scenery of a region, even in its apparently most natural features, is affected by the nationality that occupies it, and reflects the character of that nationality. The allusions are local, but the principle they illustrate is general. A country with such a history as Germany's can have no purely natural landscape, says the Popular Science Monthly. The people and their land are the resultant of a long material development. When the Romans knew Germany—a barbarian region with few inhabitants—the works of man were less in evidence, and nature prevailed. The effects of cultivation have worked in two principal directions: First, the woods are cleared up, the water is confined within limits, the habitations of men are multiplied and enlarged and made more durable, and new plants and animals are brought in. Then uncontemplated changes step in, which proceed of themselves from the works of cultivation. With the drying of the soil the climate is modified. The introduction of new plants and animals imposes new features upon the conditions of life. Where before only stretches of heath, moor, and swamp formed natural openings in the predominant forest, extensive woodless regions arise through the labors of man, from which the shade-loving plants and animals that were protected by the forest gloom disappear, and other inhabitants are at home in the cultivated fields. The variations in the particular shaping of these changes are more especially marked where the boundaries run through mountain regions. In the Saxon Erzgebirge the forests have lost all their wildness, and plantations of firs and oaks grow in regular order, all nearly of a height, with no trees towering into prominence, and the mountain has the trimmed and symmetrical appearance of a nursery. The brooks are tamed, dammed, and made to earn their right to be as the servants of the mills. Passing over the mountains and going down the Bohemian side, we are in the woods again, with the valleys free and irregular, and the brooks running according to their own will. The contrast is seen again, but less marked, in going up from Bohemia and down into Bavaria. Within Germany itself the garden tilled plots near the industrial centers and the little rectangular holdings of the southwestern and middle districts, each distinctly marked off from its neighbor, and making the whole look like a party-colored checkerboard, impress one very differently from the immense fields devoted to single crops and the commodious barns of the north. Other differences may be seen on the upper Rhine, where the inhabitants of both sides were originally the same people, but have been subjected to different influences in the course of their history. The French have made their marks all over the Alsatian territory and in the towns of quite another character from the native German aspects of the Baden side.

Brought in Ballast.

A sailing vessel arrived at the port of New York a short time ago from South Africa, and a layman who asked the captain what he brought was surprised to hear that the cargo consisted chiefly of sand. "We brought it," said the captain, "not for its commercial value, but for ballast. Our cargo for this port was light, and to give the ship proper immersion we had to load her with African earth."

There are many articles in the line of raw material which may be brought into American ports free of duty, and these articles are frequently taken at ridiculously low freight rates, sometimes at only a trifle more than the cost of handling at both ends of the voyage, and they are practically ballast; but when there is nothing to transport, shipmasters frequently take earth, as in the case of the African vessel. The popular ballast, though, is stone. This is sometimes sold to contractors after the ship has come to port, and enough is realized in some instances to pay for the handling.

"Often," said a sailing master, "we begin to discharge our ballast when we get near port if the weather is favorable, and if we have no fear that we shall be too high out of the water, and by the time we tie up we have nothing aboard in that line. There are stones and all sorts of rubbish just outside of New York Harbor from all ends of the earth that came in just that way and were thrown overboard. Water ballast is carried in compartments below the floors, but it is shipped merely to stiffen the ship, while other burdens must be added to give the ship the proper immersion."

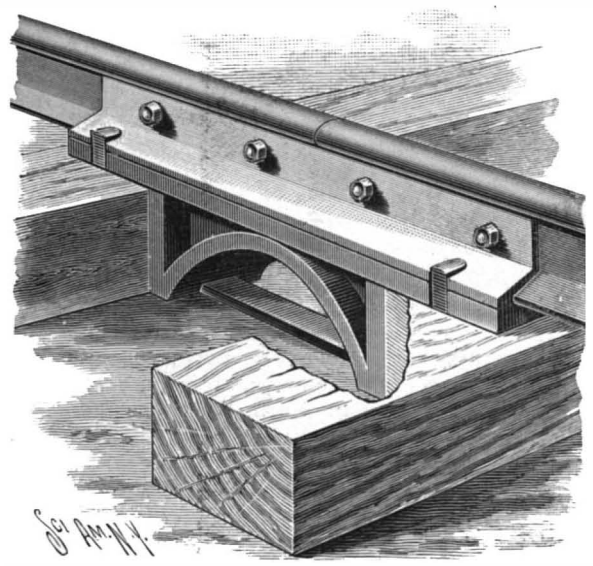
The ballast question has been a serious one for the salt producers of the United States in the course of the last few years, says the New York Tribune The laws of the country provide that salt may be brought free of duty from any country into which American salt may be shipped free, and the consequence has been that for the year ending June 30, 1896, 546,753,181 pounds of salt came to various ports of the United States free of duty. The United States exported in the same time only 9,765,552 pounds, and, while the imports amounted to $745,743, the exports brought American producers only $40,542. The salt came principally from the West Indian Islands, and was landed at many ports. Boston received 83,000,000 pounds, and among the other large amounts were the following:

	Pounds.
New York	71,000,000
Philadelphia	44,000,000
New Orleans	41,000,000
Gloucester, Mass.	38,000,000
Baltimore	36,000,000
Galveston	34,000,000
Savannah, Ga	31,000,000
Beaufort, S. C.	21,000,000
Mobile	18,000,000
San Francisco	16,000,000
Portland, Me.	13,000,000

It was explained at the Custom House that much of this salt was used by packers of meats and fish and that a large quantity went back to the countries from which it came in a different form.

A RAIL JOINT SUPPORT AND BEARING PLATE.

The illustration represents a support for railway rails at their joints, designed to prevent the ends of the rails from becoming battered, and thus, also, adding to the life of the rolling stock. The improvement has been patented by Woodley Brugler, of Columbia, N. J. The fish plates are of the angled type, engaging the web and flange of the rail, and the rails and fish plates are supported upon a bearing plate which extends from one tie to the other beneath the joint, the same spikes holding the fish plates, rails and bearing plates in position on the ties. To strengthen the bearing plate, however, an arch support is provided, extending between the ties, the support having integral end plates which bear against the sides of the ties as well as against the under side of the bearing plate, while the



BRUGLER'S RAIL JOINT SUPPORT.

central portion of the arch bears directly against the under side of the bearing plate. The arch is strongly made, so that it will not spread under pressure, a cross bar connecting the ends of the arch at the bottom, and the rails being thus supported to form a continuous, even tread surface at the joints.

Air and Athletics.

What the man of to-day needs most is not athletics in a gymnasium, but plenty of fresh air in his lungs. Instead of a quantity of violent exercise that leaves him weak for several hours afterward, he needs to learn to breathe right, stand right and sit right. And if the woman who spends so much time and strength getting out into the air would dress loosely and breathe deeply and so get the air into her, she would have new strength and vigor, and soon be freed from many aches and pains and miseries.—H. L. Hastings, in the Phrenological Journal.

"Is there such a thing as intrinsic value?" the Mining and Scientific Press asks. Certainly. It is intrinsic qualities which give intrinsic value. Generally, what is meant is that the article embodies in the form in which it is offered for sale, not only original intrinsic qualities, but the actual labor and expense of its production. It is a term, however, which is applied in many different ways, and often is used when "exchangeable value" is meant. An article may have intrinsic value and yet have no exchangeable value. Water is one of the necessities of life, but it is usually so easily obtained that it has no commercial value. A man will be slow to give up a thing, which has cost him labor, for water, when he simply has to dip it up or stoop down and drink. The moment, however, that water has to be forced long distances to places where it is needed, it immediately possesses both intrinsic and exchangeable value. The cost of transportation may add to the value of an article just as surely as labor.

Science Notes.

Fontainebleau's great grapevine produced 7,672 pounds of grapes this year, which when recently sold at auction brought $715.

While excavating for a pond on the farm of L. V. Harkness, near Donerail, Ky., recently, workmen discovered the bones of a mastodon.

Lord Kelvin has received from the Paris Académie des Sciences one of its Arago medals in honor of his jubilee, and M. d'Abbadie, the Abyssinian explorer, the other.

It is proposed to erect a tablet in honor of Prof. Giuseppi Sanarelli, the discoverer of the microbe of yellow fever, at the University of Sienna, of which he is an alumnus.

The Silesia Verein Chemischer Fabriken, at Woischwitz, near Breslau, provides carbonic acid water for its employes during the summer. The families of the workmen are also supplied freely with this water.

Vaccination laws are not enforced in England. At Norwich, with a population of over 100,000, the vaccination officer's fees this year amounted to about $40; he receives 50 cents for each case.

Three Italian physicians, Drs. Lustig, Galeotti and Malenchini, have returned from Bombay with a preventive serum for the plague, which they assert is superior for the purpose to Dr. Yersin's. It is not intended to cure but to prevent the disease, is more easily prepared than Yersin's, is free from bacteria, dry and harmless to man and beast. It is introduced by injection in small doses mixed with sterilized water, producing a slight local rash, which disappears in twenty-four hours. The doctors tried it on their own persons.

That certain beetles are by no means frightened by lead foil has long been recognized, but it is rather discouraging to add one more to the number of these culprits. Ed. Stich, of Nauheim, reports that a box somewhat worm eaten was lined with lead. After awhile holes one-eighth of an inch in diameter, and distinctly spiral, were noticed, and traced to the beetle Tetropium luridum, Linn., which was not yet on the list of lead eaters, or rather lead destroyers. A cousin of this insect has been known to be destructive to lead chambers. There are, unfortunately, many insects and animals devoid of that sense for the sacred rights of property which we expect of everybody but ourselves.

The bones of a prehistoric monster have been discovered on a large farm about a mile south of Batavia. While Philip and George Baker, dairymen, were digging a grave for a dead horse, at a depth of about three feet the shovel struck an obstruction which, on being pried up with a rail, was broken. It turned out to be an ivory tusk in a splendid state of preservation. A portion of the tusk is of the consistency of chalk. One end of it, however, was not injured, and was of solid ivory. It is five feet in length, about five inches in diameter at the widest end, and at the point about two and a half inches. A portion of a rib, about thirty-six inches long, was also found. Dr. E. E. Snow, who has traveled extensively in Africa, pronounced the tusk that of a mastodon.

Some interesting observations concerning the physiological effects of electric currents have been made by M. Dubois. He finds that the effect depends much more upon voltage than upon intensity. With the same voltage, for instance, a fall of the resistance from 270,000 to 72,000 has no effect, at least as far as the minimum of perception is concerned. But a profound effect is produced by the insertion of external resistances, owing to their self-induction. Even the most non-inductive resistances have a marked effect. The inductance of the human body is practically zero, and hence the great difference produced by the slightest internal inductance. But the effect of an external resistance may be compensated by inserting a capacity in the circuit. In one case quoted a capacity of 0·0045 microfarad re-established the physiological effect which had been canceled by the insertion of a resistance of 600 ohms.—Dubois, C. R., No. 2, July, 1897.

The Committee on Indexing Chemical Literature has presented its fifteenth annual report, which states that a bibliography of the metals of the platinum group, 1748–1896, by Prof. James Lewis Howe, and a review and bibliography of metallic carbides, by Mr. J. A. Mathews, are ready for publication. A bibliography of basic slags has also been completed by Mr. Karl T. McElroy. The second edition of Dr. H. Carrington Bolton's catalogue of scientific and technical periodicals, 1665–1895, which contains 8,603 titles, will shortly be published, and a supplement to the select bibliography of chemistry, by Dr. Bolton, has been completed. The latter contains about 9,000 titles, including those of many chemical dissertations, and is brought down to the end of the year 1896. Progress is also being made with indexes to the literature of thorium and tantalum, a bibliography of oxygen, and a bibliography of the constitution of morphine and related alkaloids.

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Influence of Mountains in Producing Dark Color Forms.

BY PROF. A. S. PACKARD, IN THE INDEPENDENT.

It is well known that insects, more especially moths and butterflies, inhabiting Alpine slopes or mountain regions are darker than individuals of the same species, or of allied species, living on the drier and warmer lowlands. We have been struck with the numbers of black moths and butterflies to be seen in Alpine valleys of Switzerland, while dark or melanotic individuals occur in the White Mountains and on the Labrador coast. It is also the case with beetles. Leydig was, perhaps, the first to point out that variation toward greater darkness of coloring, the tendency to become black, is connected with the action of moisture. Eimer, in his "Organic Evolution," has shown that elevation has, besides moisture, been the cause of melanism, which he has noticed in the case of the slug (Arion). On all the mountains which he explored, e. g., the Black Forest, the Harz and Rigi, the greater number of the specimens, or even all, were dark, almost black. And he adds that only two causes, apart from moisture at high levels, seem to him possible, e. g., either light or decreased atmospheric pressure. Previous, however, to Eimer, Dr. Weinland, who lived some years in this country as a collaborator of Agassiz, observed melanism in various animals, and stating in 1876 that Arion, on the heights of the Alb, near his own home, was usually dark, makes the following statement:

"It might be said that darker pigment is always produced on mountains, as in Vipera prester, the black mountain variety of Vipera berus, as in the black rattlesnake of the White Mountains, in North America."

Another factor is evidently cold, as well as moisture and elevation, as proved by recent temperature experiments of Weismann, W. H. Edwards and, more recently, Merrifield. This subject was brought to our attention while walking along a road in Madison, N. H., in which lay dead a remarkably black striped, or garter, snake (Eutænia sirtalis). On each side of the narrow dorsal dull greenish-yellow line were two black bands about a quarter of an inch wide. We have never seen on the lowlands and coast of Maine and Massachusetts a snake of this species with such a preponderance of dark markings or wide bands. Near this was also seen a dead young milk snake, probably, like the other, run over by a carriage. It was about sixteen inches in length, and darker than the Osceola doliata var. triangula figured by Cope in his "Factors of Organic Evolution;" and the inside of the black wings along the back was filled with brown-black, thus forming large blackish-brown patches. On seeing these apparently melanotic snakes, which may or may not prove to be peculiar to the White Mountains region, for a melanotic garter snake has occurred in Tennessee, according to Cope, we recalled the statement of Weinland in reference to the dark mountain viper of Central Europe, and the black rattlesnake of the White Mountains. A day or two after returning to Intervale, N. H., we heard that a rattlesnake had the week previous been seen by a lady on Mount Surprise, near the farm of Mr. Durgin Eastman, who killed the creature. On visiting him we were told the snake, which was three feet nine inches long, and with seven rattles, had been buried. Exhuming it, the specimen was found to be very uniformly black on the upper side, becoming toward the tail spotted with still darker ocellated spots, while the under side of the body was whitish as usual. It was surprisingly dark, or melanotic, and evidently forms a remarkable local variety, or color form, which merits more notice than has been bestowed upon it by our herpetologists. It is quite apparent that this is a true melanotic variety, the variation having been caused by altitude, cold and moisture. These same factors apparently operate in producing unusually dark local varieties of the other snakes of the White Mountains region. Our Eastern rattlesnake (Crotalus horridus) has a wide geographical range, extending from the New England States and Canada to near Florida, and westward to central Kansas; and yet Cope, who has made a special study of the variations of our American snakes, remarks that it scarcely varies at all, apparently overlooking Weinland's back variety. In the low mountains just south of the Catskills we have been told by an observing woman that the rattlers there are of the usual grayish or dirt color.

Apropos of this snake in the White Mountains it is more abundant than we had supposed. We were told that on or near Bartlett Mountain, near Kearsarge village, a rattler was killed two years ago, and a man had been known to kill between one and two hundred, or at least four or five snakes a day, for the sake of the oil, each snake yielding about two ounces. They were, until a few years since, seen quite often on the mountains. In this region it is very sluggish and not dangerous.

Since writing the foregoing lines we have seen a finely stuffed rattlesnake, killed at Tiverton, R. I., in August, 1896, now in possession of J. M. Southwick, curator of the museum at Roger Williams Park, Providence. The snake is fully three and a half feet long, with eleven rattles, and though darker than those of the Middle and Southern States, it is ash-gray between the blackish circular bands, the latter irregular, but averaging about three-quarters of an inch to an inch in width; it is dark on the tail. The White Mountains individual, in the state we saw it, did not present any appearance of alternating light and dark, circular bands, the entire dorsal region being uniformly blackish-brown, almost black.

A FLOATING DRY DOCK FOR HAVANA.

On September 15 the New York newspapers announced that the Spanish authorities of Havana had a perplexing problem to solve. The floating graving dock which had been completed for the Spanish government by Swan & Hunter, of Wallsend, England, was found to draw too much water for the bay of Havana; so a dredger was ordered by cable from the United States, with instructions to send it immediately "at any cost." There are several difficulties in the way of providing a dredge in short order, as it would be necessary to know more of the nature of the bottom of the bay. Since Havana was founded, in the sixteenth century, no one has ever dredged the bay. The result of this unforeseen hindrance is serious, as the dock will soon be towed into Havana.

Wherever fleets of vessels congregate there, of necessity, docks are required. They are of two kinds, wet and dry. The latter may be divided into two classes—stationary and movable or floating docks. One of the earliest records of the floating dock we have dates from the year 1776, in which year a shipwright constructed in the Thames a floating dock of timber which was used for the repair of vessels. In 1785 another dock was constructed with an end gate which was lowered to admit a vessel and afterward raised, and the water pumped out of the dock. It is stated that prior to these dates—in fact about the time of Peter the Great—a north country captain in the bay of Cronstadt, wishing to repair his vessel, found an old hulk floating in the bay, and arranged means for letting in and pumping out the water, so as to form a floating dock. The name of the hulk was the "Camel," and to the present day a contrivance for raising and lowering weights in the water by attaching them to watertight iron or wooden boxes which can be emptied or filled with water at pleasure is in frequent use by engineers, the box being called the "camel."

The essential characteristics of the floating dock are that it shall be possessed of sufficient buoyancy when required to float both itself and the vessel placed upon it, and that its construction shall insure its stability when floating both with and without its load, while it must also be sufficiently rigid in construction to afford efficient support to the inclosed vessel at all points, resembling in the latter respect a fixed graving dock.

The floating graving dock for Havana, which was launched on August 28, is a new type only recently introduced by the engineers, having been first described in a paper read by Mr. Lyonel Clark, of the firm of Clark & Standfield (the inventors of this type of floating graving dock), before the Institution of Naval Architects at the Hamburg meeting last year. It is a compromise between a graving and a floating dock.

A graving dock, simply described, is a recess excavated in a foreshore, lined with masonry, and closed at its entrance by a movable gate. The excavation is allowed to fill with water and the vessel is hauled in. The end gate is then closed and the water pumped out, leaving the bottom of the vessel dry. It is usually constructed of masonry, but it might be built of steel, and if the invert were of sufficient strength as a girder to carry a vessel on its middle, such a dock would be independent of the support of the ground, but might be made a floating dock. That belonging to the British government at Bermuda is a floating dock of this description, one of the disadvantages of which is that, since the bottom of the ship can only be got at by removing the water from around it, the height of the gates which close in the pound in which the ship is placed must as a minimum be equal to the draught of the ship, and when the pound is empty they have to withstand the external water pressure, so that they must be heavy and powerful structures; and besides, from economical and engineering reasons which need not be detailed here, this type of dock is sometimes very unsatisfactory.

A floating dock is merely a watertight box or pontoon into which water can be admitted or pumped out as required, the ship being lifted or supported simply by the displacement of the pontoon, which consequently must be sufficient to carry the weight of the ship, that of the pontoon itself, and the weight of the walls of the floating dock. This requires a depth of water which is sometimes unattainable. The floating graving dock built for service at Havana effects a compromise between the graving and the floating dock, and combines in a single dock the advantages of both types. It is an ordinary two-sided floating dock of an over-all length of 450 feet, with a lifting power of 22 tons per foot run, and in respect of large merchant vessels there are no gates at the ends to prevent a ship of a greater length than 450 feet overhanging to any extent. The Havana dock is of the minimum length, and consequently of reasonable first cost, while the ships repaired by it are, as regards position, dealt with in the most convenient and favorable manner. There is the economical advantage, too, that the cost of lifting a ship is proportional to its weight.

However, in addition to this, it may be made to lift ironclads of a unit weight of more than 22 tons by being converted into a dock of the Bermuda type, by closing in its ends by means of gates, or rather caissons, and removing the water from the pound formed by the sides of the dock and these caissons, for which latter various positions have been arranged, so that they may always be placed close up to the bow and stern of the vessel, no matter what its size, within the limits of 450 feet, thus fulfilling the condition that the lifting power of the dock should only be applied directly under the ship, and that the lifting power of the dock per foot run should always be equal to the weight of the ship per foot run. The advantages thus possessed by the new type of Messrs. Clark & Standfield are reasonable length and reasonable cost, minimum expenditure of pumping power in lifting vessels, and equal facilities for lifting merchantmen or ironclads, while all vessels lifted are placed on a platform either above or only a foot or two below the water level, thus enabling repairs to be done under the best conditions as regards light and air. The advantages of a floating dock over a fixed graving dock are obvious, but this new type happily combines the chief advantages of both.

The following is the official description of the dock. The floating graving dock was built to the order of the Spanish Colonial Office, for use in the island of Cuba, at the port of Havana, having been rendered absolutely necessary since the recent insurrection in Cuba, since the Spanish government has to maintain a somewhat large fleet in the waters of the Gulf of Mexico, and it is absolutely necessary to dock, clean and paint these vessels at regular intervals. The type of floating dock accepted by the Spanish authorities is the latest improvement in this class of structure, and consists of three portions: (1) The pontoons, or body of the dock, affording the required buoyancy; (2) the high sides or walls, regulating the descent of the pontoons below the water, and also affording the necessary stability; and (3) the movable caissons or gates, they are only used when it is required to increase the lifting power of the dock. The length over all of the dock is 450 feet; the clear width between the broad altars, 82 feet; the depth over the sill, 27 feet 6 inches; the draught of water under these conditions being 42 feet 6 inches and the freeboard 4 feet 2 inches. The pontoons are five in number, the three middle ones being rectangular in shape, and the two end ones being finished off in the form of a point. The width of all the pontoons is 87 feet 11½ inches, the length of the rectangular ones is 75 feet and that of the pointed ones 108 feet 4 inches. There is a space of 2 feet between each pontoon. They are separate from and lie wholly between the two walls, to which they are strongly bolted. The extreme breadth of the dock is 109 feet.

The deck is constructed throughout of mild steel of the quality usually employed for shipbuilding purposes. Each pontoon is divided into four watertight compartments, and each wall is divided below the engine deck into five watertight compartments, so that the entire structure is divided into not less than thirty absolutely watertight spaces. Each of these compartments can be emptied of water by means of an electrical pumping installation. This consists of two generating plants, one in each wall, but with connecting cables, so that either can serve the whole dock. Each plant is complete with boiler, engine and direct coupled dynamo. The power is transmitted by cables to ten electric motors, five in each wall, having their switches and resistances located in the valve houses. These motors are vertical and drive direct on to the shafts of the horizontal centrifugal pumps placed in the bottom of the walls. The pumping machinery is capable of lifting an ironclad of 15,000 tons weight in two and one-half hours, which means that 15,000 tons of water must pass through the pumps before the process of lifting is complete. The whole of the electrical machinery has been supplied by Messrs. Scott & Mountain, of Newcastle, and it includes a complete system of electric lighting throughout the dock. In order to render the dock efficient and suitable for lifting short heavy vessels such as ironclads, a caisson is fitted at either end of the dock. These caissons are so adapted as to be adjustable to various lengths of vessels, the greatest distance apart being 383 feet and the smallest 350 feet, these lengths representing the longest and shortest armored vessels of the Spanish navy.

Another important feature in this dock is the arrangement by which any portion of it can be examined, repaired, cleaned and painted. Each pontoon can in turn be detached, lifted and hung up on the side walls, and there any necessary work can be executed. The underneath portion of the walls may be exposed for cleaning and painting by careening the structure. The dock is thus what is now termed self-docking. The dock itself will during the passage across the Atlantic be manned by a captain, officers, engineers

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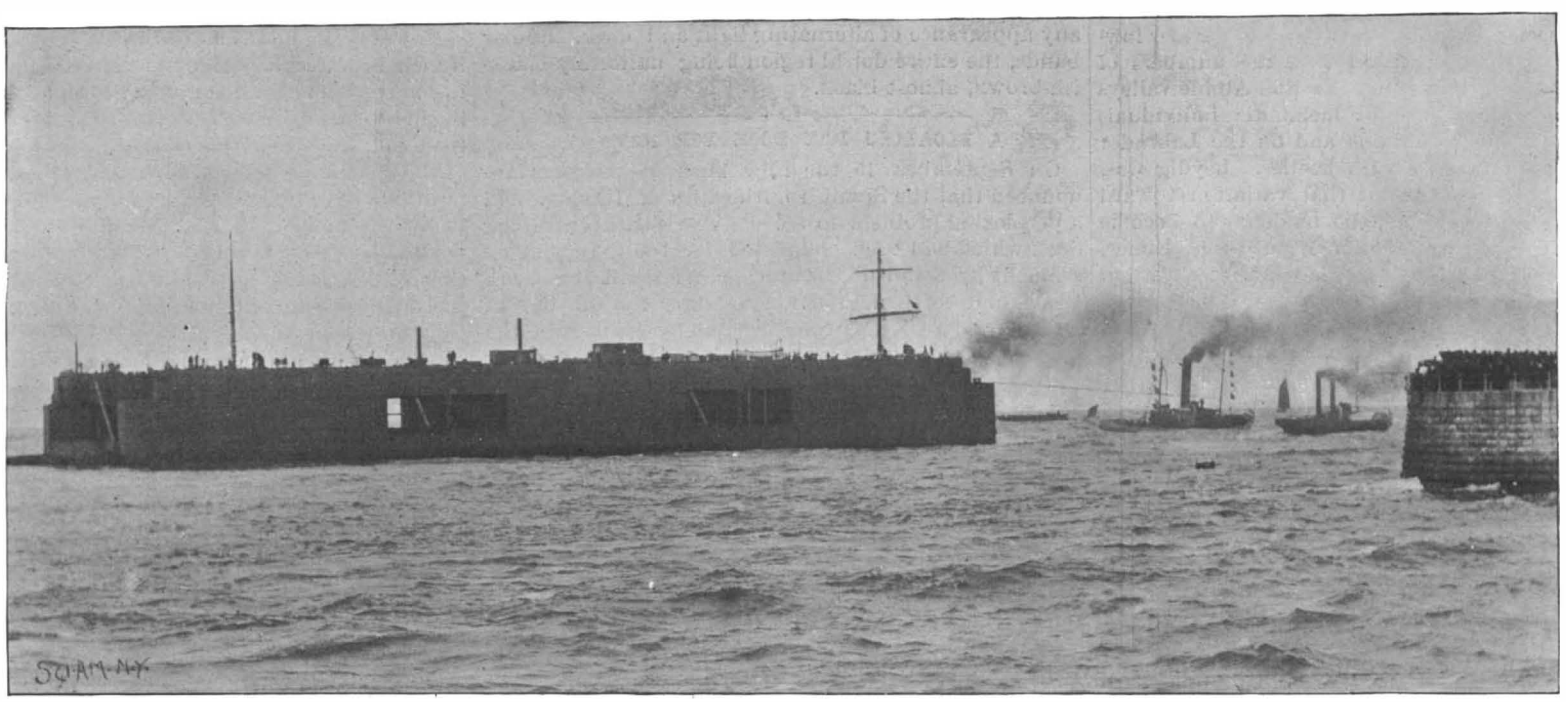
and crew, accommodation for whom is provided in one of the walls of the dock above the engine deck. The dock itself is provided with a fore mast and square sails, together with a jigger mast aft, and has steam steering gear, steam windlass, anchors, cables and every minor appliance necessary for the voyage. An interesting point about this dock is that electricity has been used as the motive power for pumping the water from its interior. This is generated by means of two sets of Messrs. Scott & Mountain's compound vertical engines, each driving direct on to a Tyne dynamo.

Both motors and pumps run on steel balls like bicycle bearings. The power generated by the motors is sufficient to lift a vessel weighing 10,000 tons. The Havana dock will leave the Tyne in the tow of the New Zealand Shipping Company's powerful steamer Ruapehu for Havana, and she is expected to arrive there within six weeks of her departure. A manila hawser for towing has been specially made for the purpose and is twenty-two inches in circumference and weighs nearly five tons. The dock will commence her regular work of docking vessels immediately after arrival; so that, within eleven months of the Spanish government's decision to acquire docking facilities, Cuba will be in possession of one of the largest, most modern and economical docks in the world. The dock is said to have cost $900,000.

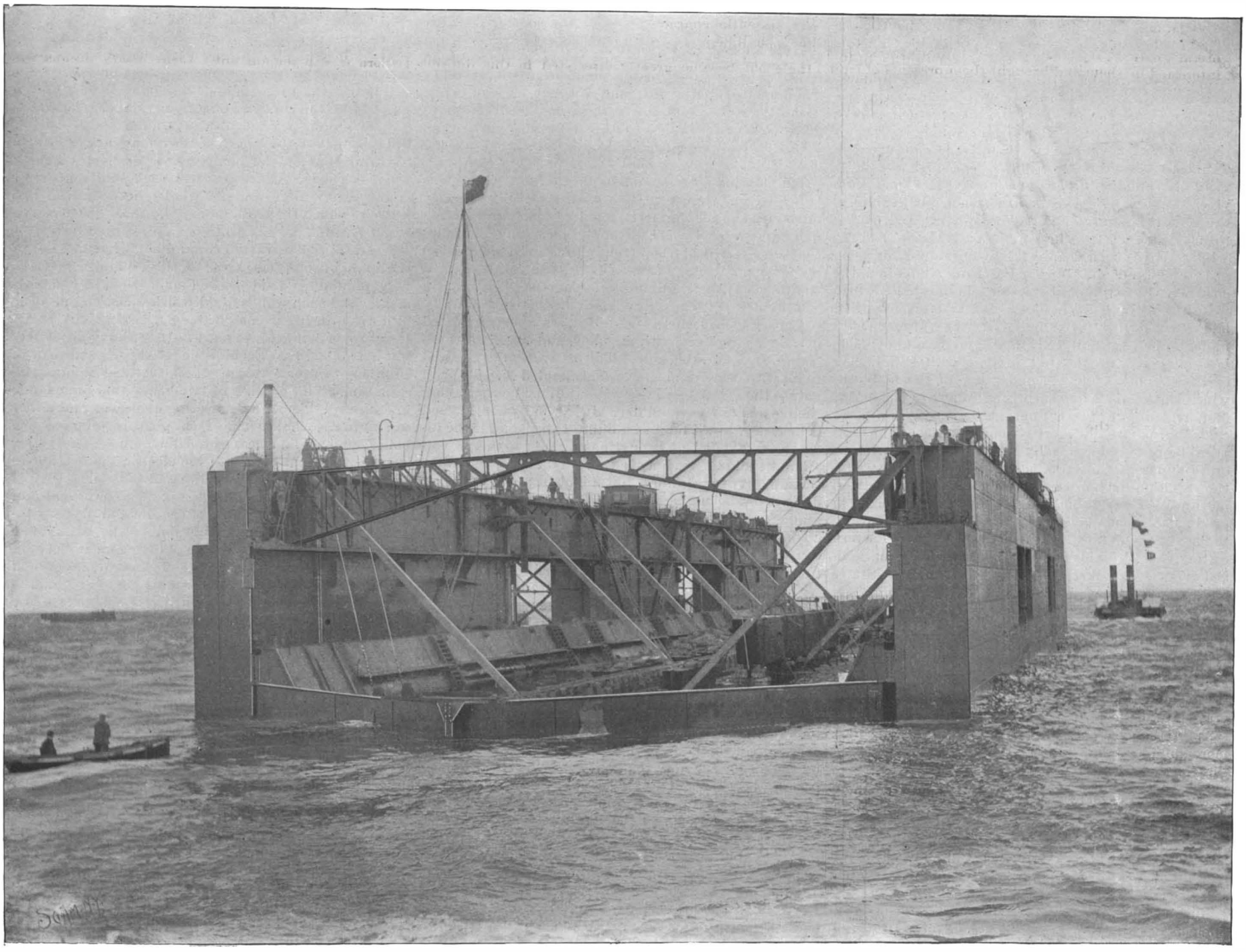


FLOATING DRY DOCK CONSTRUCTED ON THE TYNE FOR THE HARBOR OF HAVANA.

Steel Trackways for Wagons.

The office of Road Inquiries of the Department of Agriculture has made arrangements with the Cambria Iron Works, of Johnstown, Pa., for rolling special rails for steel trackways for wagon roads. The directors of the road inquiries and the engineer of the ironworks have agreed upon a plan of track in which no wood is used in the construction and no cross ties used for support. It consists of a simple trough or channel of steel for each wheel, with a slightly raised bead on the inside to guide the wheels, each channel resting in a bed of gravel and the two tied together occasionally to prevent spreading. The bearing or tread for wheels is eight inches wide, the thickness about seven-sixteenths of an inch; the weight is about 100 tons per mile of single track road. It can be furnished in small sections at the rate of $3,500 per mile. The first order for track has been given by the New York State Agricultural Station.

ALL single track railways of Russia are being converted into double track lines, and it is expected that in all main lines the change will be completed before the close of the current year.—Uhland's Wochenschrift.



THE TWELVE THOUSAND TON FLOATING DRY DOCK EN ROUTE FOR HAVANA.

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THE RETURN OF THE PEARY EXPEDITION.

(Continued from first page.)

last ton of coal and with her bulwarks smashed. The vessel was nearly as deep in the water as when she left the port for the North, the great Cape York meteorite, the largest in the world, being in the hold embedded in tons of ballast. Important ethnological collections were made on the trip, and the party visited Cape Sabine and procured relics of the ill-fated Greely expedition. The various parties which had been left at different points on the way North were taken on as the steamer came southward. The summer in Baffin Bay was marked by almost continuously stormy weather and an unusual scarcity of ice. The Hope coaled at Sydney and proceeded to Brooklyn, N. Y., where she was on exhibition a couple of days at the foot of Dock Street, a small admission being charged, the proceeds going to swell Mr. Peary's exploration fund. The Hope bore the marks of her tussle with the waves and ice of the Arctic seas.

Through the kindness of Mr. and Mrs. Peary, the special photographer of the SCIENTIFIC AMERICAN was enabled to obtain some very interesting views of the six Esquimaux and their three dogs, as well as the work of raising the great meteorite from the hold of the Hope. The Esquimaux are six in number and are named as follows: Keshu and his son Mini; Knu-psu and his wife Antun gna and their children Wekshak-supsa, a boy ten years old, and Ahwwea, a girl thirteen years old. They are rather stolid, patient and pleasant looking people, but they were uncomfortably warm in their close fitting suits of sealskin. The mother of the children is forty-seven years old and is not four feet high. She held a little reception in the bow of the boat and smiled pleasantly as she shook hands with visitors. The whole party was quartered there, little tents of skins being erected for their shelter on deck. These Northerners have brought three of their Esquimau dogs along to keep them company.

These Esquimaux belong to a race of Arctic highlanders which have proved themselves very useful to Mr. Peary in the past. Visitors were greatly interested in them and brought them presents of fruit, candy, peanuts and the like, and at last, on the afternoon of October 1, the heat became so great that they were obliged to deny themselves to visitors and retired into the hold, where they dressed with a freedom entirely of the Arctic circle. The male is distinguished by wearing short leggins, and their finger nails are pure white, as may be seen from the engravings. The Esquimaux will assist Mr. Peary in arranging his collections.

The Hope was towed to the Brooklyn navy yard on October 2, and the great meteorite was removed from the hold. Our engravings show the Hope lying at its dock with the crane near it and the actual raising of the meteorite through the hatchway. The meteorite is about 12 feet long, 8 feet wide and 6 feet thick. It is variously estimated to weigh from 45 to 90 tons and is the largest known meteorite. It is composed of about 92 per cent iron and 8 per cent nickel. In appearance it is a bluish black and it needs a close inspection to disclose its metallic nature. Sir John Ross heard of the meteorite on his trip to Cape York in 1818. Half a century ago, when Inglefield returned to England after exploring along the northwest coast of Greenland, he reported that the natives in the region of Cape York tipped some of their weapons with a metal resembling iron. These natives, when asked where they got the metal, replied that it came from some great stones. Inglefield became greatly interested in this information, but his efforts to locate the stones were futile. Other explorers tried, but they also failed. But it was not discovered until found by Lieut. Peary four years ago. He says: "I do not wonder that the ignorant natives of that hyperborean country looked upon the strange object with awe, believing that there was something supernatural about it. They have never thought of damaging it, although it has been in their power to do so. Truth to tell, I first heard of the meteorite from the Esquimaux, who excited my curiosity by telling me of an enormous stone that lay on the coast, having been thrown there by some god or other."

ROBERT E. PEARY, C.E., U.S.N.

The meteorite was found on the northern shore of Melville Bay, on the west central coast of Greenland, not far from Cape York. When Mr. Peary found the meteorite, in 1894, all that could be seen of it above the surface was a little of its top. After studying the problem for some time, he concluded he had not the appliances with him to load the meteorite. When he went north last spring he took with him a number of hydraulic jack screws, having determined that the meteorite should be moved to a point where it could be loaded by means of these hydraulic jacks. The meteorite lay only a short distance from the shore, and when the Hope anchored in Melville Bay the crew, armed with pickaxes and spades, went ashore and began digging about the meteorite. At a depth of about seven feet they reached its lower surface, and, having exposed it on all sides, the hydraulic jacks were brought out, the tackle made ready and the great mass of iron slowly moved to the shore on skids. Getting the meteorite into the hold of the Hope entailed a good deal of arduous labor and risk. Beams were stretched from the bulwarks of the ship to the meteorite and tracks laid thereon. By means of hydraulic jacks it was forced up the track to a point where gun tackles were utilized, when it was lowered into the hold. Here it was surrounded with sand ballast and propped with twelve inch beams. The work took five days, and every man of the crew was pressed into service to accomplish the task. The ship had to be lightened as much as possible, so that with the enormous mass of metal she might make the return voyage in safety.

The Hope was towed to the Cob dock, in the Brooklyn navy yard, and the meteorite was removed by the big government derrick, which is capable of lifting 100 tons. The meteorite was placed east of the receiving ship Vermont, where it will remain until Lieut. Peary decides what he wishes to do with it. The meteorite lay on a timber platform in the vessel's hold, amidships. The platform was bolstered up by stone ballast. It was constructed of four heavy timbers, without flooring. Enough ballast was removed from beneath the meteorite, just inside the cross pieces connecting the ends of the two longest timbers of the platform, to permit the two chains to pass under the mass and be connected. Then the winding engine was started and the meteorite began to rise slowly out of the hold. The meteorite was swung clear of the ship by the crane, and was at last deposited on terra firma.

The work was watched by five or six hundred people, many of whom had journeyed long distances to the navy yard to see the great meteorite removed. The work was done under the charge of Capt. Melville. The great floating derrick was moored alongside the Hope at 9:30 in the morning, and at 12:30 the meteorite had been deposited on the Cob dock. Lieut. Peary was an interested spectator, and is seen near the meteorite.

GROUP OF ESQUIMAUX ON BOARD LIEUT. PEARY'S SHIP "HOPE."

Lieut. Peary

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spoke of his future plans as follows: "In addition to securing the meteorite, I laid the plans for next year's expedition, and when I leave again, which will be about the end of next July, it will be to remain up there until I reach the pole or lose my life in the attempt, if it takes five years to accomplish this object. The Hope might be strengthened so as to answer our purposes, but I must now have my own vessel. The Hope has only been chartered, and it will be a question of terms whether we go in her or not.

"Next summer I shall take my vessel up to Sherard Osborne Fjord, and make that place my base of supplies.

"On the last trip I made arrangements with the Arctic highlanders, a tribe of Esquimaux, consisting of 230 men, women and children, known as the most northerly tribe of human beings on the earth, to put in this coming winter obtaining bear, seal, and deer skins for our clothing, and in securing all the walrus meat they can for dog food. I have singled out eight young men of the tribe, with their wives, canoes, dogs, sledges and tents, to accompany me to Sherard Osborne Fjord, which is about 300 miles further north than their present abode.

"My party will consist of a surgeon, possibly another white man and myself; the rest will be Esquimaux. The latter know how to drive dogs, they can go hungry, and know how to get food.

"The conditions under which I shall make the coming expedition are of the most satisfactory character. The American Geographical Society has assured $150,000 to meet all expenses, and I have been given five years' leave of absence. I shall probably buy a new ship for next year, though we may use the Hope again. Mrs. Peary will not accompany me.

"I am quite sure that I shall succeed in reaching the pole. Nansen got within 260 miles of it, but Andrée did not have one chance in a thousand when he started to drift over the pole. I do not think Andrée will accomplish anything, and may have lost his life long ere this in his attempt."

The Stigmata of Degeneration.

Scientific writers of the Lombroso and Nordau type have reached conclusions, we think, says the Alienist and Neurologist, too radically adverse and illogical against the mental stamina of the present generations of men, from their so-called "unerring evidences" of the stigmata of degeneration.

Nordau is perhaps excusable because of his vocation as a newspaper man and amateur scientist, being naturally enough trained to sensationalism, but the extremely pessimistic outlook which Lombroso's inadequate and uncritical comparisons offer is scarcely pardonable in a real votary of exact science, and the aim of all scientific writers who claim public attention to their writings should be absolute, unimpeachable fidelity to nature and the rules of logical deduction in all of their observations and conclusions.

Not to enumerate all of the many signs of cerebro-spinal degeneracy these writers dwell upon, we here only mention diminutive stature, deformities of body, supernumerary and deficient members, malformations and asymmetry of the cranium and face, malformations and permature decay of the teeth, too early baldness and gray hair and, paradoxical as it may appear, excessive growth and quantity of the hair, etc., though the latter and each and every evidence above given may be and often is a real evidence of individual or racial decadence, but they are not invariably nor always so.

The value of Lombroso's observations and Nordau's testimony against the neuro-mental integrity of the human family of to-day—the value of their testimony in the direction of organic degeneracy, depends upon many considerations. Conditions of nutrition and strength even of the strongest endowed organisms depend upon the influence of environment as well as of heredity. To be normally resistive without undue decay, to have what might be termed pendular power of going or falling back only to a certainly defined limit, to have due expansibility and contractility, to bend like the well strung and tempered bow, but not to break under severe stress of environment, is to be neurotically normal.

To break under more than ordinary strain is not to be unduly defective.

But to break under ordinary stress of environment is to be neuropathic.

To let the teeth and hair go prematurely under such overpowering influences as an overmastering sorrow or bereavement or peculiarly unbearable reverse of fortune or unusual stress of toxic disease, coupled with neglected inadequate medication and undermining environment, such as would in other natures destroy the integrity of the brain and overthrow the reason, is a sign of strength rather than of weakness. Nature in such organisms throws off the superfluities like a gladiator or a man-of-war in action and holds on to the essentials. They come out of the battle of life scathed in these cosmetic appendages, but essentially sound in their central organisms.

Under great stress of study and the persistent goading presence of an overweening ambition, coupled with a sedentary life, we often see the descendants of great brained and bodied ancestors diminish in stature but maintain the ancestral brain power in frames reduced in size only.

The jewel is there. The casket is good though smaller and will often reappear enlarged to the normal ancestral proportions in descendants from whom the pressure of severe study and sedentary life in the developmental period of the bony frame is withheld.

This is the normal neurotic resiliency of neurally healthy families, and where it exists the individual or family is not necessarily degenerate, and where this regeneracy in a race or people is not destroyed the race or people cannot rationally be said to have become degenerate.

Pessimistic anthropological writers like Lombroso and Nordau do not give adequate logical weight to the inherent neurotic resiliency of normal organisms. With them all apparent are real defects and all are entailed without physiological attirement in subsequent generations.

History gives us patent proof of the fallacy of some of the false anthropological reasoning that has lately set the world to lamenting the degeneracy of the race.

For instance, Byron's hat was too small for the head of any of his contemporaries, and though he compromised his growth during the developmental period and became dwarfed in consequence, there is no evidence of degeneracy in Childe Harold, but of mental power which should have been allowed more years in maturing. His brain and its premature use and development shattered his frame as a large boiler and engine would a steamboat too small and delicate for its power.

And the animalism of a remote ancestry reappeared in some of his moral derelictions after the inhibitions of his better nature had been undermined by disease resulting from a premature and excessive strain of brain and goad of ambition. His poise was disturbed, but cause enough existed to change physiological into pathological.

We gage our great men too severely when, under great mental stress, such as entirely destroys ordinary men, they reveal some long ancestrally repressed weakness or morbid peculiarity.

Some years ago, when I was in Washington, circumference hat measurements at a certain Washington hatter's were taken by an enterprising reporter scientifically inclined like Max Nordau, the newspaper man who wrote "Degeneration" in a fit of pessimistic sensational despondency. These measurements included the head covering and showed the circular dimensions and peculiar conformation of the heads of Benjamin Butler and his colleagues in Congress and the janitor of the Capitol. Senator Dunn, of Indiana, had a circumference hat measurement of six and five-eighths just above the ears, but very symmetrical. Butler's head was "bumptious," asymmetric, as was the majority, large or small, of the members' heads, while the colored janitor's head showed best of all for symmetry and size in these measurements. The story the hatter's conformator tells of its record of the inequalities and irregularities of distinguished heads would astound Lombroso and confound his asymmetry conclusions. Yet there is a logical use for asymmetry in determining the question of mentality.

But the duality of the brain as shown in the cerebral hemispheres first announced by Wigan and later by Brown-Sequard, and the vicarious power of the lobes and convolutions under certain stress of imperative necessity, first announced by myself as early as 1872, is something like the vicarious and substitutive power of the right and left hands when, under certain circumstances, the one the individual is accustomed to use is destroyed or disabled.

As man is ordinarily naturally right handed, so he is usually left brained, using the left hemisphere almost exclusively for thinking, the center of active speech being on the left side in right handed persons. Yet he can by proper and timely training become ambidextrous in the hemispheres of his brain as in his limbs.

The loss of the hair and teeth and the arrest of skeletal development under great brain strain is sometimes Nature's conservative process as regards the brain's integrity, so that neither of these signs is always significant. Were skeletal development and stature the test of mental power, where are we to place the little corporal who became the greatest general of his time, who remodeled the map of Europe, placed kingly crowns on the plebian brows of his family and defied and made servile even the mighty hierarchy of Rome? He was never equaled as a military strategist, and only lost at Waterloo when the power of Great Britain was thrown in the balance against him with the aroused antagonism of Europe and an accident of dereliction, as a trusted ally failed him at a critical moment, when his fate was sealed by the delay, if not delinquency, of Grouchy. True he became a degenerate, had epileptic spells and died of cancer, but so did Thomas Benton, of Missouri, die after thirty years in the United States Senate, a giant among the mentally great of stature in Washington, and so died General Grant after he had saved the Union and a worthless financial confidence man had buncoed him and wounded his high and noble spirit beyond mortal endurance, as St. Helena broke the spirit of Napoleon, and made him a prey to ills of the flesh he had escaped when with his victorious legions he was master of Europe.

And just here is one of the potent causes of degeneracy. Great shocks and strains of the nerve centers of the great weaken resistance to agencies that cause disease.

Douglas and Greeley and Blaine died not long after disappointing defeats, and the strain of premature study took several cubits from the otherwise predestined stature of Pope and Young, the latter filling an early grave from consumption, while Aaron Burr, with a nervous constitution built to stand any storm, withstood political failure, disappointed ambition and merited contumely with the stoicism of a Benedict Arnold, as Job endured his calamity with the moral heroism of one proud of his integrity and conscious of having preserved it.

In estimating the value of teratological defects it is important to consider all causal conditions before making a final estimate. Contracted pelves and instrumental deliveries should be estimated as would a club foot, which may be mechanical or developmental as in true talipes, or as in the foot of a Chinese upper-class belle, the stigmatum of degeneracy being in the latter instance in the mental make-up of the parents and the people who countenance the torturing deforming procedure developing it.

Health "Don'ts."

Don't neglect your house drains, nor the drainage about your house. The first condition of family health is a dry and sweet atmosphere. With dry walls, a dry cellar, and drains that carry off refuse without letting in foul gases, half the battle for good health is won.

Don't let your wells or springs be infected by drainage or from other causes. Pure drinking water is indispensable for health at home or anywhere.

Don't keep the sun out of your living and sleeping rooms. Sunlight is absolutely necessary for a right condition of the atmosphere that we breathe and for our bodily well-being.

Don't sleep in the same flannels that you wear during the day.

Don't wear thin socks or light-soled shoes in cold or wet weather.

Don't catch cold. Catching cold is much more preventable than is generally supposed. A person in good physical condition is not liable to colds, and will not fall victim to them unless he is grossly careless. Keep the feet warm and dry, the head cool, the bowels and chest well protected; avoid exposure with an empty stomach; take care not to cool off too rapidly when heated; keep out of draughts; wear flannels; and with the exercise of a little common sense in various emergencies, colds will be rare. If colds were a penal offense, we should soon find a way to prevent them.

Don't neglect personal cleanliness, but use the bath with moderation and in accordance with your general health. The daily cold bath is right enough with the rugged, but it is a great tax upon the vitality of persons not in the best health, and should be abandoned if the results are not found to be favorable, and tepid water used instead. Each man in these things should be a judge for himself; that which is excellent for one is often hurtful for another.

Don't have much confidence in the curative nature of drugs. The above is from the Phrenological Journal, which adds: Remember that Dr. Good Habits, Dr. Diet, and Dr. Exercise are the best doctors in the world.

International Congress of Naval Architects and Marine Engineers.

This congress, convened by the Institute of Naval Architects of Great Britain at London on July 6, was attended by representatives of thirty-eight countries and institutions of Europe and the Americas.

It was opened by his Royal Highness the Prince of Wales, assisted by the Duke of York, the First Lord of the Admiralty and Earl Hopetoun, the president of the Institution. After the reading and discussion of the several papers which were submitted, the congress adjourned on the 10th inst. following and the members were conveyed by special train to Southampton, Glasgow, Greenwich, Dumbarton and Newcastle, where the various ship yards and engine shops were visited. Among the representatives of the American Society of Naval Architects was our old friend Mr. C. H. Haswell, who is still hale and hearty, despite his eighty-eight years.

AUSTRIA, with Hungary, had 5,737 miles of railroad at the end of 1896. The gross revenue was $52,000,000, the working expenses $35,000,000, and the net revenue $17,000,000 on an invested capital of $570,000,000.

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THE PARASITES OF ANTS.

Formicaries are inhabited by a large number of animals that are different from the legitimate owners thereof, and that seem to live therein as if they were at home. What are the exact relations of these aliens with the ants? Are they parasites, commensals or mutualists? What is their mode of life? Such are the questions that M. Charles Janet has undertaken to solve, with a patience and perseverance worthy of Reaumur. We are going briefly to make known some of the results obtained.

In the first place, in order to collect ants, along with their progeny and their myrmecophiles (as the foreign guests of formicaries are called), M. Janet employs a very ingenious process. In order to obtain specimens of the inhabitants from the deep portions of the formicary without injury to the latter, he introduces wooden traps into them and leaves these in place until he wishes to make observations. These apparatus are formed of a strip of hard wood of round or rectangular section, containing a series of small independent chambers, each of which is provided with a gallery by means of which it may be reached. At the moment of setting this trap, honey or sugar may be put into some of the chambers. After such a trap (which naturally can be employed only on earth nearly free from stones) has remained in place in a formicary for several weeks, it is found that the ants have taken possession of some of the chambers, along with their progeny and myrmecophiles, just as they would have done in galleries excavated in the heart of an old root. Quite a convenient variant of this apparatus is that in which the piece of wood provided with the holes that allow of entrance to the chambers may slide to a certain extent, so that at the moment at which it is removed the holes that are at the right of the chambers may be brought to the right of the partitions. In this way, it is possible to imprison the clod and carry it intact to the laboratory, where it may be studied at leisure.

One of the most common parasites of the ants of the genus Lasius is an acarid, the Antennophorus Uhlmanni. This does not move around in the formicary, but lives constantly upon the body of the ants. As a general thing, an ant carries one acarid under the head and two to the right and left of the abdomen. If an antennophorus be detached and laid upon the bottom of an artificial formicary, it will be seen to extend and agitate its antennæ (or, more accurately, its antenniform legs), in order to ascertain whether any ants are approaching; and it will extend and agitate them still more if an ant happens to pass in front of it. At the same time, it rises upon its two hind pairs of legs and stretches out the pendent pair in front of it. But, whatever be their position, it always manages to place at least one of the legs of its first pair either upon the head or abdomen of an ant or upon the back of an antennophorus already installed. The substance exuded upon the surface of the extremity of the legs is strongly adhesive. Owing to this property, the acarid instantly adheres to the ant upon which it has managed to place one of its legs. As soon as the antennophorus has succeeded in creeping upon the ant, the latter, even in cases in which it is already carrying several of these parasites, struggles vigorously. It threatens with its mandibles, rubs itself with its legs, and especially curves its abdomen in order to touch the new comer with its anal appendage moistened with venom. But the parasite has usually had time to take one of its normal positions, and the ant soon resigns itself to the labor of carrying its new burden. The parasites easily pass from one ant to another. When the ants are grouped one against another, the parasites are often observed to stand erect upon their hind legs and stretch out their front ones (and particularly their antenniform ones) toward the ants in the vicinity; and, at times, there is seen one that has decided to effect the passage. If a goodly number of ants, each carrying a single antennophorus, be placed apart in an artificial formicary, it will be observed after a few hours that some of the ants are free from the parasites, while others are carrying two or three.

The exclusive food of the antennophorus is the nutritive liquid that the ants secrete in their crop. These parasites do not feed while the ant that carries them is collecting food, but are observed to take a portion of the nutritive liquid that the ant is made to disgorge by one of its companions. These acarids know how to obtain food (aside from the disgorgement from ant to

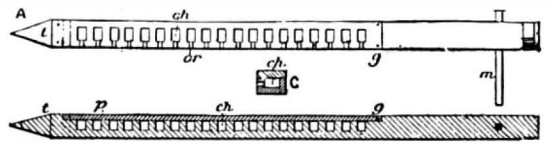

Fig. 2.—TRAP FOR CATCHING ANTS AND THEIR PARASITES.

ant), either by demanding it from their host or from an ant that happens to be near them. Although the parasites are, as a general thing, not very cordially received by the ant upon which they creep, they are no longer maltreated after they have installed themselves upon their host. In artificial formicaries an ant is often observed in the act of carefully licking the body of one of its companions. If, during such operation, it comes near an antennophorus, it manifests no surprise, but, continuing its work, licks the back of the parasite, and, if it comes near the latter's mouth, cheerfully gives up to it a drop of liquid food.

Another acarid, the Discopoma comata, is also frequently discovered upon ants. It is found in very small number in the galleries, but in very large numbers upon the larvæ of the males and queens, and especially upon the abdomens of the adult workers. When a discopoma is placed upon the floor of a gallery of the formicary, it moves about thereon with the antenniform legs directed forward. When an ant passes in the vicinity it rises upon its hind legs, and, if it can reach the insect, creeps upon it. Although the ant endeavors to free itself from the parasite, its efforts are in vain, because the acarid applies the edges of its carapax so closely to the body of its victim that the legs of the latter slide without getting any purchase.

The ants resign themselves to their fate and tolerate these parasites as soon as they have installed themselves upon the abdomen, where they generally place themselves in threes—one on each side and one in the middle. These parasites live by thrusting their buccal organs through the ant's cuticle and sucking the internal liquids.

All the myrmecophilous hosts, fortunately for the ants, are not so dangerous. One of the most benign is certainly the Lepismina polypoda, which moves about among the ants, but takes good care never to remain immovable in their neighborhood.

If the receptacle filled with honey that is placed in an artificial formicary be removed for a few days, and then be put back, several ants will be observed to visit it and make a long repast; and when these, after their crops are well filled, re-enter the inhabited chambers, they will be assaulted by their companions, which come to demand a part of the food. The division begins at once. The giver and taker rise slightly one in front of the other. The first separates its mandibles and sticks out its tongue, which its companion seizes with its jaws and causes the disgorgement of a few drops, which are immediately absorbed. As soon as the first food suppliers have re-entered the formicary, the Lepisminæ show that they have perceived the odor of the honey. A goodly number of ants soon group themselves in couples for the disgorgement, leaving a certain space between them beneath the head. As soon as a lepismina comes near such a couple it rushes into this space, quickly seizes the drop that is passing before it, and then hastily makes off as if to escape pursuit. But the ants, standing one against another, are not free enough in their movements even simply to threaten the bold thief, which immediately goes to put another couple under contribution; and thus it continues its quest of food until its hunger is appeased.—La Nature.

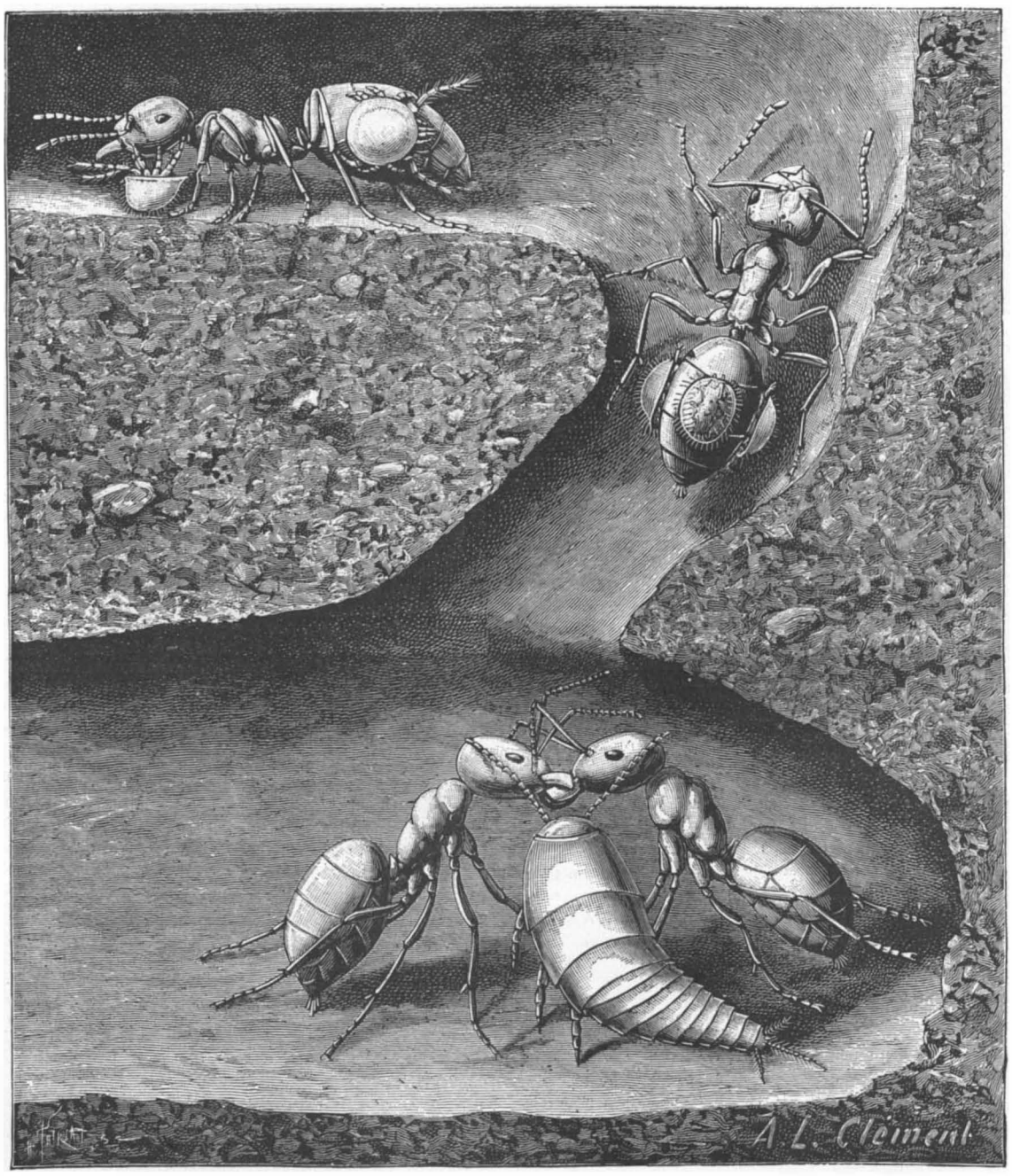

Fig. 1.—SECTION OF A FORMICARY, WITH ITS INHABITANTS, HIGHLY MAGNIFIED.

Nature as an Educator.

Dr. M. L. Holbrook gives the following excellent advice as to the education of children: "So far as possible, a love of nature should be early and continuously inculcated. Nature is, in a physical sense, the father and mother of us all, and a child that grows up to maturity with a genuine love of rocks and trees, flowers and insects, animals and plants, storms and sunshine, cold and heat, fresh air or the ocean wave; of every varying landscape and mood of nature and all the activities around us, stands not only a better chance of possessing a healthy nervous system, but of maintaining it during life, than if the opposite has been the case. I am not at all in sympathy with any system of education which takes children far away from nature. Nature is a book, a great library of books, whose authorship is the Infinite. Our little works, our libraries, vast and valuable as they are, cannot be compared with it. They are poor transcripts at best of the thoughts of half developed human beings."

AT the last quarterly meeting of the American Statistical Association, Dr. S. W. Abbott, secretary of the Massachusetts Board of Health, presented some interesting figures regarding the proportion of pulmonary tuberculosis in males to that in females in Massachusetts. The rate in 1851 was 1,451 females to 1,000 males; in 1890, 1.055 females to 1,000 males; and last year only 974 females to 1,000 males. Last year was the first in the history of the State in which the number of deaths from phthisis in females was smaller than that in males. The fact that a uniform reduction in the rate of female deaths began some five years ago, about the time women began to ride the bicycle extensively, Dr. Abbott considers significant, and he is inclined to attribute the decrease in the death rate to the great increase in open air exercise among women which has been inaugurated by the use of the bicycle.—British Medical and Surgical Journal.

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RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY ENGINE. — Oliver C. Fitts, Carpentersville, Ill. This invention consists principally of a cylinder with valve chests connected with each other and with the steam supply, a piston turning in the cylinder, and abutment valves sliding in the valve chests and in and out of the cylinder. One of the abutments has a port adapted to register with the connection leading to the other valve chest to admit steam to the latter after the first valve has moved into a cutoff position, the steam being used expansively during about one-fifth of the revolution of the piston, the power being utilized under full boiler pressure for each complete revolution of the piston.

HYDRAULIC OR PNEUMATIC TUNNELING SHIELD.—Cornelius G. Hastings, Chicago, Ill. This shield has a front section with cutters at its forward end, a rear section having a number of chambers and a hood removably mounted on its rear end, while brackets or chairs are arranged in the hood, and a crane beam or arm is mounted to rotate on the rear wall of the rear section. The shield is forced longitudinally into the ground by hydraulic or other jacks, the distance of each movement substantially equaling the length of the jack pistons, and the several jacks being simultaneously operated.

REDUCING IRON SPONGE.—Gustaf M. Westman, Hackettstown, N. J. A continuous process and apparatus is provided by this invention for reducing iron ores directly with gases, in a simple and inexpensive manner, without injury to the quality of the product. The process comprises the reducing of the ore by a mixture partly of newly formed gases and partly of a gas previously passed through the ore and afterward heated and carbureted, which is effected by means of a specially designed furnace, whereby a sufficient quantity of gases at the necessary temperature will be introduced into the reduction furnace.

Railway Appliances.

CAR COUPLING. — Gaston C. Lewis, Crescent City, Fla. Each drawhead, according to this invention, has two link mortises side by side, one mortise being provided with a coupling link and the other with a coupling pin, there being a spring which holds the link in operative position and a spring bar to operate the coupling pin, in connection with a double armed, tilting, pin-releasing device. The coupling of cars is effected automatically, the links of each drawhead entering the pin mortise of the other and slipping under the pin into coupled engagement, while the uncoupling may be readily effected from the top or either side of the car.

Electrical.

RHEOSTAT.—Thomas M. Pusey, Kennett Square, Pa. In rheostats for use in connection with voltage regulators for dynamos, this invention provides one of simple construction, in which the contact arm may be moved with a wheel to which motion is imparted by a regulator, while the parts are so made that the contact arm may be moved independently of the wheel. It comprises a base on which are arranged a series of contact plates, a threaded rod extended from the center of the base and an interiorly threaded sleeve engaging the rod, while a contact arm consisting of two sections removably clamped together is mounted to rotate on the sleeve.

Bicycles, Etc.

BICYCLE LAMP IGNITING DEVICE.—Will Rafel and Charles G. Knoerzer, New York City. A fixed and a yielding jaw, according to this improvement, are arranged one above the other and formed with side arms for attachment to the lamp casing, to permit of pushing a match laterally between the jaws to ignite the match head and light the wick, the match then being moved sidewise and in an opposite direction, by which the burned match is taken out of engagement with the jaws and out of possible contact with the supporting arms, after ignition has taken place. The device is simple and durable and can be readily applied to any of the usual types of bicycle lamps.

BICYCLE LAMP. — Harry W. Sturges, Brooklyn, N. Y. This is a lamp which may be readily folded up into a small space to be conveniently carried in the pocket, and quickly extended to be attached to the bicycle when desired. The fount has a wick tube and wick-raising device, and to it is hinged a bail with which is pivotally connected a folding casing, there being a perforated hood on the top of the casing directly above the wick tube, and means for locking the casing to the wick tube. A cap, to be removed previous to extending and setting up the lamp, prevents the spilling of oil from the fount.

Mechanical.

MECHANICAL MOVEMENT. — John H. Youngken, Butte, Montana. For transforming a reciprocating movement into a reversing rotary movement, this invention provides a peculiarly constructed crosshead, through which is passed a rotary-threaded shaft, there being means for reciprocating the crosshead on the shaft. The invention is adapted to that class of machinery in which it is desired to impart an alternating rotary movement, or a rotary movement in one direction, for a certain length of time, and then a reverse movement for a similar length of time, with great ease and without unusual wear and strain on the working parts.

WEB-DRYING CYLINDER. — Friedrich Wippermann, Stotzheim, Germany. A rotary drying cylinder for fibrous matter, paper, pasteboard and tissues is provided by this invention, the cylinder being heated by a coil rotatably arranged in a cylindrical inner space, the apparatus being completely protected against any explosion, while an insulating casing prevents loss of heat, and is designed to lessen the consumption of steam, as compared with drying apparatus heretofore employed.

SHINGLING STOOL.—William H. Allen, Griggsville, Ill. This is a device for use entirely independent of brackets, on which boards are to be placed, or strips attached to the roof to support the feet, and may be moved independently to any part of the roof, remaining wherever it is put. It consists of a board which forms the seat, attached to which are adjustable arms or legs adapted at their lower ends to engage the roof, an adjustable arm connecting their lower ends with the upper edge of the board forming the seat. Detachable feet are also provided for use when the seat is employed on metallic or slate roofs.

Agricultural.

POTATO PLANTER —Millard F. Myers, Greenville, O. In this machine the power for operating the mechanism is derived from a sprocket wheel on the axle, according as a clutch is moved by a lever within easy reach of the driver, the same lever also affording means for controlling the furrowing shovel and another shovel to cover the potatoes after they are dropped. The hopper has a central circular chute in which is a shaft having at its lower end a two-part seed-dropping disk, the shaft having pins adapted to keep the potatoes in the chute stirred up and prevent their wedging together, the whole arrangement being adapted to make the even and regular planting of potatoes more certain than by machines heretofore in use.

HAND FERTILIZER DISTRIBUTER AND PLANTER.—James L. Pede, Sackett's Harbor, N. Y. This is a light and inexpensive machine with which the fertili ing material may first be placed in the hills and the seed then dropped immediately afterward, or it may be used for planting seed only or distributing fertilizing material only. A shaft passing down through the hopper and operated by a crank arm at the top is revolved by a handle to carry down a drill, and, on reversing the drill, fertilizing material carried in a tubular section of the shaft is discharged, an attached seed box being also operated to discharge seed when required.

THRASHING MACHINE STACKER. — William Hart, New Bedford, Ill. This stacker is adapted to be readily folded when transporting the machine from place to place, and may be turned in any desired direction when in use to discharge the straw as required. On the rear end of the lower sill of the separator frame is an auxiliary frame carrying a turntable with bearings for a shaft connected with an operative part of the thrashing machine, and on the shaft is hung the lower section of an apron frame, to which is pivotally connected an upper section, an apron or slat belt being carried over both sections of the frame when the machine is operated. The apron is preferably provided with pins to hold the straw and chaff in place as it travels from the machine to the stack, to be discharged from the apron as it passes over an outer pulley.

Miscellaneous.

MECHANICAL MOVEMENT FOR TIME LOCKS —Elzy R. Williams (address W. E. Burnett, 119 North Nineteenth Street, St. Joseph, Mo.) This invention provides means by which, on the accidental breaking of the mainspring of a time lock, the lock may be prevented from becoming permanently fastened, thus obviating the necessity of breaking it or the safe or chamber to which it is attached. It is adapted to all classes of time locks, having either moving or stationary barrels, is inexpensive, and can be applied by substituting a new mainspring barrel and providing the necessary bearings for the other parts in the time lock frame. The invention covers certain combinations or features of construction by which, upon the breaking of the spring, movement is transmitted either to throw the bolt to released position, or to throw certain mechanism by which it is possible to subsequently and manually throw the bolt.

STAMP AFFIXING MACHINE.—Walter Forward (address John F. Forward, San Diego, Cal.) Two patents have been granted this inventor for machines for sticking or placing postage stamps on mail matter—as letters, papers, etc.—and it may also be employed for affixing labels or the like to packages, the machine being of comparatively simple construction, separating the stamps one at a time from the strips and quickly affixing them in position. An actual working model of one of these machines has been made and successfully used in the office of the County Recorder at San Diego. As many reels as may be desired for holding the stamps may be used with the machine, each reel to contain stamps of different denominations, from 100 to 500 in number, it requiring but a moment to take out one reel and insert another.

NEWSPAPER FOLDING AND ADDRESSING MACHINE.—Cyrus N. Walls, Taylorville, Ill. This is a combination machine adapted to receive the printed sheets as they come from the press, folding the sheet and inserting a supplement where necessary, delivering it to addressing devices, from which it is fed to a wrapping mechanism or discharged onto a receiving table, all of the operations being continuously and automatically carried on. The several drive mechanisms are so adjusted and constructed that each set of devices will operate at predetermined intervals in folding and feeding the sheet and delivering it to the addressing mechanism, the addressing wheel turning the space of one address as each folded paper is fed onto the fly.

ENVELOPE. — Frank E. Munn, New York City. A device for opening envelopes, and which constitutes practically a portion thereof, while concealed therein, is provided by this invention. It is located at one or both ends or sides, and is a thread, wire or cord interlaced or stitched in an edge of the envelope, being so connected therewith that there are no ends exposed or left to be covered by tags or the pasting on of protective paper or pockets or shields. Portions, however, of the thread, cord or wire may be seen, but drawn so close to the envelope as to afford no chance for accidentally opening it, but which may be drawn upon by the thumb and fingers to purposely open it, with a sharp cut and without mutilating its contents.

INKING PAD.—Jonathan H. Melven, St. Louis, Mo. In the base portion of this device is a central ink fountain from which extend lateral channels or grooves, vertical channels thence extending upward, and a sheet of apertured felt being placed on the base block, and on this sheet of felt a sheet of absorbent material, and preferably two or more covers of fabric, the whole being held in place by a binding strip and cover The ink is carried up from the bottom portion of the pad out to the top, thus preventing gumming or an undue accumulation of ink on the top surface, and when the latter becomes unduly worn it may be torn off to expose a new surface, other covers being substituted when all of the covers have been used up.

SNOW PLOW.—Henry V. Guertin, Worcester, Mass. The framing of this machine is supported by wheels connected with a tongue, for drawing along the machine, and pinions on the rear axle are made to revolve a shaft carrying radial blades to be revolved continuously while the machine is in motion, the outer end of each blade carrying a bucket, the buckets and radial chutes casting the snow into a funnel and delivering it in a windrow at the side of the machine. To increase the area covered a diagonal scoop blade is secured to the right of the machine to draw the snow inward to be taken up by the buckets.

STEREOSCOPE FRAME. — Herbert S. Walbridge, North Bennington. Vt. In frames or holders for portable stereoscopes this invention provides a novel bridge piece for the hood, comprising an inverted V-shaped wall section, affording a division wall which centrally projects up between the lenses, the members of the bridge piece becoming extensions of the elliptical hood at its lower side. The bridge piece contacts with the nose when the stereoscope is in use, thus effectually excluding the light, while its ends extend up between the lenses, so that each eye can only see through the lens directly in front of it.

LANTERN SLIDE MOVING DEVICE.—Hugo Newman, New York City. To facilitate moving slides to and from a magic lantern. the magazine, in this device, has a guideway communicating therewith, with an opening for the disclosure of slides, the guideway being in telescopic sections, that its length may be adjusted, while a spring-pressed shifting finger extends through a slot in the magazine wall to engage a lantern slide, there being means for moving the shifting finger to carry the slide from the magazine into the guideway. By this means a lecturer at a distance may cause the slides to be moved consecutively in front of the lens of the lantern, dispensing with the aid of the usual attendant.

FENCE POST. — Charles Shuh, Newberry, Ind. The base for this post is of properly burned clay or similar material, having longitudinal recesses in its sides, and a central polygonal aperture adapted to receive the twisted foot of a metallic standard constituting the post proper, the standard having a flange which rests on the top of the base to close its upper end. In setting the post the base is first placed in the ground, where it may be readily packed by its side recesses, and on the placing of the twisted foot in the base, it is fastened in position by cement, the hardening of which also prevents the access of moisture.

EXTENSION TABLE.—Chris N. Smith, Elgin, Ill. This is a table of that class in which extensible leaves are held beneath a stationary main frame, the leaves to be drawn out when the table is to be increased in size. The stationary portion has an unbroken top and at each side edge a metallic plate, and two pairs of rails or bars are slidably held beneath this main portion, the pairs of bars moving in guideways one above the other and carrying the extension leaves, there being means for mounting such leaves that they may be raised and lowered on the rails and made to lie level with the central top portion of the table.

SNAP HOOK.—William H. Sharp, Fremont, Mich. A snap hook of simple construction and not liable to open accidentally, no matter how much twist or pull is exerted upon it, is shown in this invention, which consists principally of two members pivotally connected with each other and having their front ends curved in opposite directions and adapted to rest one against the other, one of the members having at its rear end a handle extending over the widened rear part of the other member, to permit of conveniently opening the hook.

WINDOW CLEANING CHAIR OR PLATFORM.—Thomas Welch, New York City. This is a device which may be readily carried from one window to another in any part of a building and be securely fastened to a window in a convenient and expeditious manner. The window chair or platform has a chambered extension in which rotate tube operating screw-threaded rods carrying shoes on their outer ends, guide rods being extended from the shoes. By turning a nut in one direction, the shoes are forced to engagement with the sides of the window frame, the shoes being withdrawn on reversing the nut, and a sectional clamp being employed as an additional means of safety.

HAT FASTENER. — Dennis O'Brien, Brooklyn, N. Y. According to this invention, a spring-pressed clamping plate is mounted to swing on a hairpin having a plate-like head portion, the clamping plate being shorter than the hairpin, a hook being pivotally connected to the plate and a loop engaging the hook, while an elastic tape connects the loop to a hat.

SPOOL HOLDER.—George H. Bliss, Jr., Watsonville, Cal. This device is composed of two wires bent into suitable shape to provide a holder for spools or balls of yarn or twine, which may be attached to the dress of the user and thus retained in convenient position for use, the device being especially designed to facilitate crocheting and similar work.

COAL CARRYING VEHICLE.—Theodor Meht, Brooklyn, N. Y. In dumping carts, etc., for carrying coal, this invention provides means for sifting fine coal and dirt from the body of the coal when the latter is discharged at its place of destination. In a depression at the rear of the vehicle body, and extending nearly one-half the length of the bottom, is arranged a screen whose top plane is on a level with that of the rest of the bottom, the screen having a hinge connection with the bottom, so that by raising it the dirt and fine coal may be removed.

REFRIGERATOR MEAT WAGON.—Henry J. Kelly, Carnegie, Pa. This invention provides a wagon for the transportation of meat to be sold from house to house, the wagon being equipped with means to furnish a circulation of cold air to preserve the meat, and the construction being such that the meat may be easily withdrawn as desired. The body portion comprises an ice chest and air chambers, together with a large chamber for large pieces of meat, surrounded by a still air chamber, which also includes the ice chest, there being hooks on which smaller pieces of meat may be held, and a rotary fan, driven from one of the rear wheels, being adapted to afford a continuous current of air from the ice chest around the chambers containing meat.

GATE HINGE. — George H. Choate, Hailey, Idaho. This is a hinge by means of which the hinged part may swing freely in either direction, and will automatically return to a central position when the gate is released. On each side of the post is secured a plate, and on the spring pressed pintle of each plate is an arm hinged to plates on each side of the inner upright of the gate, the arms being crossed and the springs being arranged to keep the gate in normal position, although allowing it to swing to a right angle position to either side of the post.

NON-REFILLABLE BOTTLE.—Atmaram A. Bhise, Bombay, India. This is a bottle which may be readily filled and sealed, but which will plainly expose any attempt to refill the bottle after its contents have been unsealed and partially or entirely withdrawn. The upper portion and neck of the bottle have an outer and an inner wall forming an annular chamber, the inner wall near its upper end being perforated, so that when liquid is poured from the bottle a portion of the liquid will enter the annular chamber, and this chamber contains a medium which will be acted upon by the liquid to indicate that a portion of the contents of the bottle have been abstracted.

HORSESHOE.—George T. Berryhill, Alpena, Mich. This shoe is made with removable calks, a toe calk and two heel calks, each formed of a steel plate with beveled side edges, the upper edge of each calk fitting in a groove in the under face of the shoe, to which the calk is attached by one or more screws. These calks are so shaped and fitted in the shoe as to be firmly held and most effectively engage the ground, preventing the slipping of an animal shod with this shoe.

BROOM HANDLE. — David S. Perry, Urbana, Ohio. An upholstered handle is provided by this invention, the wooden stock or handle proper having a lengthwise groove in which is embedded the side edges of a fibrous covering attached to the handle by glue or other adhesive substance, thus giving the handle an improved appearance and adapting it for use without blistering or roughening the most delicate hands.

Designs.

LACE HEADING. — Joseph A. Filer, New York City. As a fancy corner decoration for table covers, sofa pillows, etc., this design embraces an ornamental band from which extends a triangular open network and tassel like pendant.

BELT.—Louis Sanders, Brooklyn, N. Y. This belt is made with a horizontal chain of loops on its inner face at the back.

WOVEN FABRIC.—Howard M. Bryce, New York City. This design comprises an elliptical figure with rosette center decorated with palms, and surrounding lines forming pockets of various shapes, in a field bordered by a foliated panel, a palm panel, and outside decorated panel.

CHANDELIER.—James Beesley, Brooklyn, N. Y. This chandelier is in the semblance of a drinking horn of transparent or translucent material, within which is an electric lamp bulb, the horn having an ornamental band and tip and attached suspending rods.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co. for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS, ETC.

MODERN LOCOMOTIVES. New York: The Railroad Gazette. 405 large quarto pages. Price $7.

This splendid work, with its profuse half tone illustrations and detail drawings, accompanied by specifications, is simply invaluable to the engineer and draughtsman having anything to do with this class of work. It is intended to present a complete exhibit of American locomotive practice, including full details of all types of steam locomotives, electric locomotives, and air motors, at present in use, 209 American steam locomotives being thus shown and described, 24 electric motors, and five types of compressed air motors. Most of the drawings were furnished by the railroad companies or the builders of the locomotives. Eighty foreign locomotives are also shown and described, including most of the types which have come into approved use. The work was undertaken by the late David L. Barnes, an acknowledged high authority on the entire subject, and was nearly completed at the time of his death. In twenty-six large pages of valuable prefatory matter is given much interesting information on improvements in locomotive designing and running, testing plants and experiments, and an analytical table of 137 fast and unusual runs made by regular and special trains in America, Great Britain, and on the European continent.

POOR'S MANUAL OF RAILROADS OF THE UNITED STATES. 1897. Thirtieth annual number. New York: H. V. & H. W. Poor. Pp. 1408. Price $7.50.

To say that this well known work is fully up to and in some respects surpasses the high standard it has maintained during many years is but to award well deserved credit to its publishers. The great labor involved in obtaining and arranging in good order for comparison the vast array of figures it presents is materially facilitated by the good will and aid of the railroad companies themselves, as they have learned how much investors look to its pages for necessary information, and this enables the

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publishers to make the work more valuable year by year. Besides its very complete information about the stocks, bonds, floating debts, equipment, passenger and freight earnings, etc., of the various lines and their branches and consolidations, it also contains a full analysis of the debts of the United States, the several States, municipalities, etc., and statements of street railway and traction companies and industrial corporations.

MECHANICAL DRAWING AND MACHINE DESIGN. By J. G. A. Meyer. In 24 parts, fully illustrated. New York: Arnold Publishing House.

The seventh part of this valuable work has been issued. This part illustrates steam engine design, with the computations for proportions so fully treated that the work will become a standard reference for professional draughtsmen as well as students and amateur machinists. The price is 50 cents per number to subscribers.

VOLCANOES OF NORTH AMERICA. By Israel C. Russell, Professor of Geology, University of Michigan. New York: The Macmillan Company. Pp. 346. Price $4.

Quite one-third of this volume, under the title of "characteristics of volcanes," treats of the whole subject in a general way, a sketch map also showing the distribution of active and recently extinct volcanoes throughout the world. The most striking feature of this map is the great number of active volcanoes, represented as forming an almost continuous chain on our west coast, down through Mexico and the greater portion of the western coast of South America, while of extinct volcanoes there are several groups in California and Oregon, and farther up to Alaska. The many phases of volcanic phenomena occurring in the western portion of the United States are fully treated of, and the vast lava-covered region adjacent, but the author reminds us that the three volcanic cones of Shasta, Hood and Rainier, "if melted down and run together in one pile," would still fall much below the volume of Mauna Loa, on the island of Hawaii, the "monarch among modern volcanoes," and beside which Etna and all its adjuncts are vastly inferior. The book is well worth the careful perusal of students of geology and geography, but presents facts and comments of intense interest to every reader. It is handsomely printed and has many beautiful illustrations.

SCIENCE READERS. By Vincent T. Murche. Adapted for use in schools by Mrs. L. L. W. Wilson, Ph.D., Philadelphia Normal School. Books I, II, III, IV. New York: The Macmillan Company. Pp. 127, 128, 176, 216. Price, I and II, 25 cents; III and IV, 40 cents.

This is an interesting series of books for young children, teaching in a conversational way the nature and properties of bodies; the nature, growth and structure of plants; the common types of animals; minerals and metals; the phenomena relating to the weather, etc. The several volumes and their successive lessons are graded to satisfy the growing intelligence of the child, and numerous of the most simple experiments and explanations are so plainly described and illustrated as to greatly attract and interest children, thus affording most valuable aids to parent and teacher.

MECHANICS' AND ENGINEERS' POCKET BOOK. By Charles H. Haswell. Sixty second edition. One-hundred and twenty-seventh thousand. New York: Harper & Brothers. Pp. 1037. Price $4.

The successive enlargements and the great circulation which this manual has obtained, since the appearance of the first edition, in 1843, afford the highest of all testimonials as to its value. It had originally but 284 pages, and now the index alone requires 40 pages of fine type. Its tables, rules, and formulas pertaining to mechanics, mathematics, and physics; its information about hydraulics, hydrodynamics, steam and the steam engine, compressed air, gas and oil engines, masonry, limes, mortars, etc., have made it, for more than two generations, the best known handbook of its kind, the author constantly increasing its value, in the succeeding editions, by the insertion of additional facts, tables, etc.

THE WHAT, HOW AND WHY OF CHURCH BUILDING. By George W. Kramer. New York: Published by the author. Pp. 234.

The writer is an architect who has been connected with the building of a large number of churches and Sunday schools, and he presents in this book various plans of churches, chapels, etc., together with some fine half tone views.

We acknowledge the receipt from the Department of the Interior: Bulletins of the United States Geological Survey, No. 127 (1896), Catalogue and Index of Contributions to North American Geology, 1732-1891, Darton; 130 and 135 (1896), Bibliography and Index of North American Geology, Paleontology, Petrology and Mineralogy for 1892, 1893 and 1894, Weeks; 136 (1896), The Ancient Volcanic Rocks of South Mountain, Pennsylvania, Bascom; 137 (1896), The Geology of Fort Riley Military Reservation and Vicinity, Kansas, Hay; 138 (1896), Artesian Well Prospects in the Atlantic Coastal Plain Region, Darton; 139 (1896), Geology of the Castle Mountain Mining District, Montana, Weed and Pirsson; 140 (1896), Report of the Progress of the Divison of Hydrography for the Calendar Year 1895, Newell; 141 (1896), The Eocene Deposits of the Middle Atlantic Slope in Delaware, Maryland and Virginia, Clark; 142 (1896), A Brief Contribution to the Geology and Paleontology of Northwest Louisiana, Vaughn; 143 (1896), Bibliography of Clays and the Ceramic Arts, Branner; 144 (1896), The Moraines of the Missouri Coteau and their Attendant Deposits, Todd; 145 (1896), The Potomac Formation in Virginia, Fontaine; 146 (1896). Bibliography and Index of North American Geology, Paleontology, Petrology and Mineralogy for 1895, Weeks; 147 (1896), Earthquakes in California in 1895, Perrine; 148 (1897), Analyses of Rocks and Analytical Methods United States Geological Survey, 1880-1896, Clarke and Hillebrand; 87 (1897), A Synopsis of American Fossil Brachiopoda, including Bibliography and Synonymy, Schuchert.

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References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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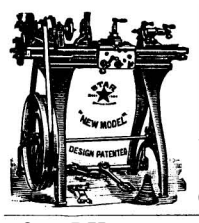

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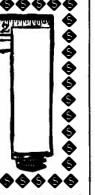

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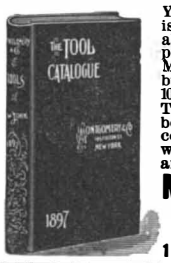

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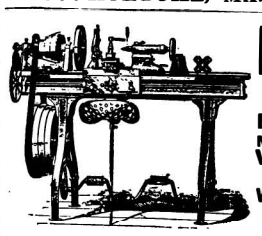

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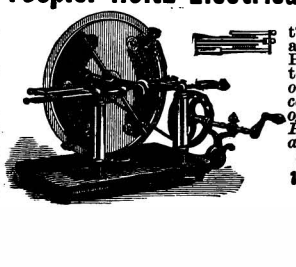

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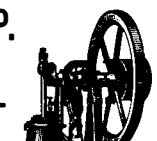

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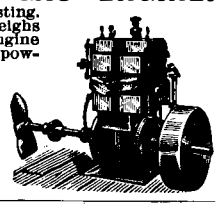

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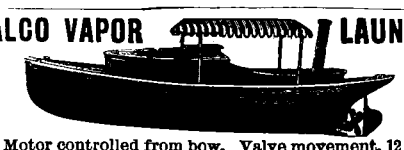

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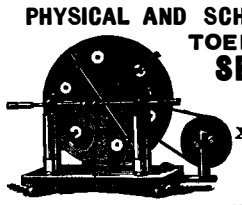

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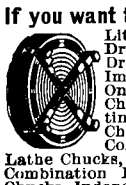

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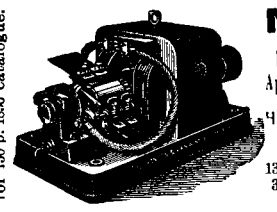

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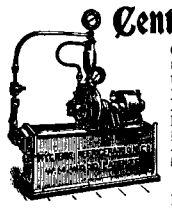

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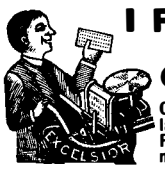

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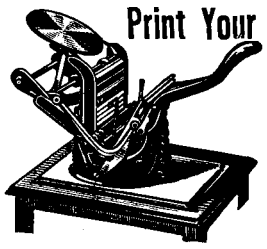

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In the list below there are thirty words from which some letters have been omitted, and their place is supplied by dashes. You are to fill in the letters in place of the dashes, and to get these names properly filled you must have considerable general knowledge. We desire you to make as many correct words as possible, and then send to us 25 cents to pay for a three-months subscription to THE AMERICAN WOMAN. For correct lists we shall give away $250.00 in cash

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3. **B-S-B-L-** A popular sport.
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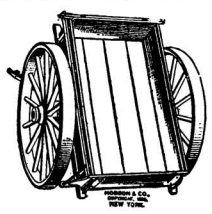

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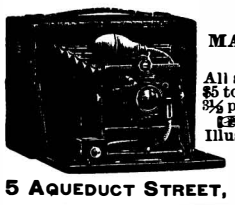

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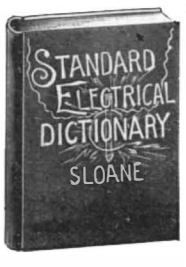

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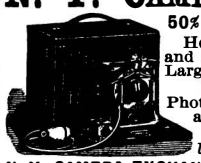

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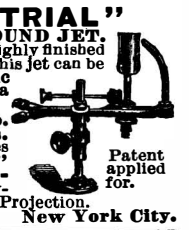

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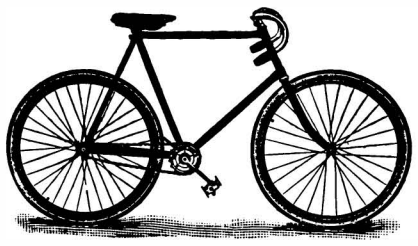

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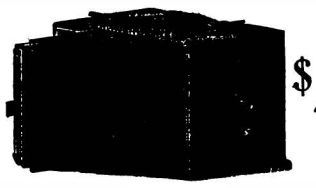

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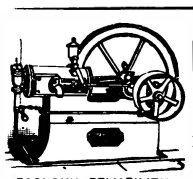

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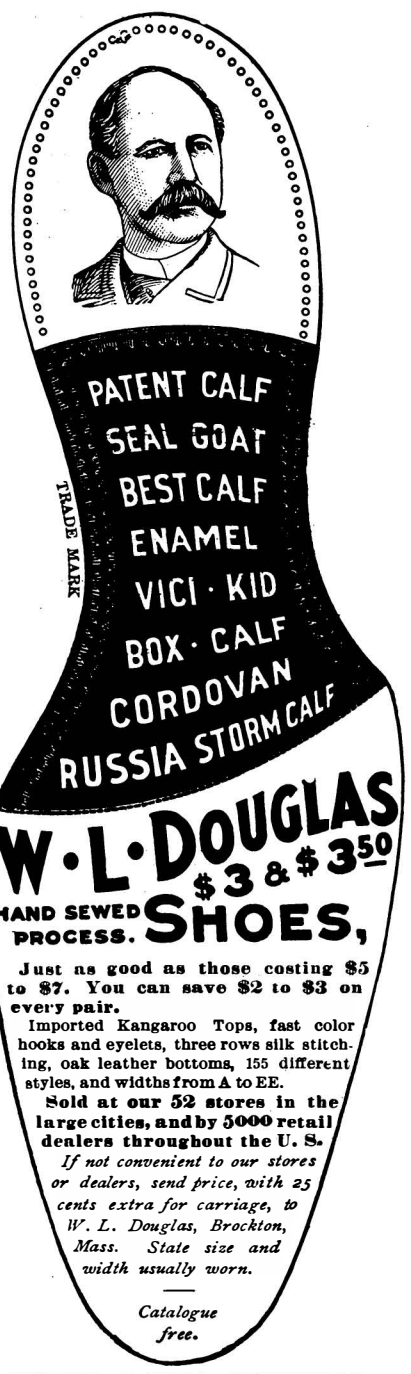

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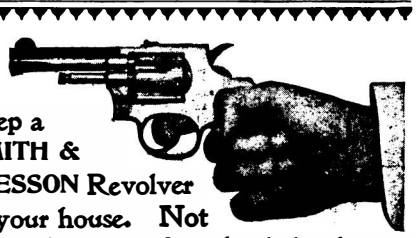

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